



JY DDA Series

General Introduction



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1. General Information

This document presents the general information of JY DDA measurement products. Table 1 lists the current available JY DDA products. The technical specifications of the DDA products are identical to those of PXIe and PCIe models. Users should follow the datasheet links to download the specifications.

Model Name	Main Function	User manual Link
DDA-5500 Series	Multi-Function DAQ	5510/5511 User Manual 5515/5516 User Manual
DDA-5320 Series	Multi-Function DAQ	5321/5322/5323/5324 Specs and Manual
DDA-9515	Dynamic Signal Analysis	9515/9516 User Manual
DDA-6311	Thermistor module	6311 User Manual
DDA-6312	Thermocouple Module	6312 User Manual

Table 1 JY DDA Products

2. Order Information

Please download JYTEK [<JYPEDIA>](#), you can quickly inquire the product prices, ordering information and available accessories.

- DDA-9515 (PN: JY4489567-01)
Distributed Data Acquisition Platform with built-in 8-channel, 24-bit, 256kS/s DSA
- DDA-6312 (PN: JY8178692-01)
Distributed Data Acquisition Platform with built-in 16-channel, 24-bit, channel-to-channel isolated thermocouple input module
- DDA-6311 (PN: JY1841190-01)
Distributed Data Acquisition Platform with built-in 16-channel, 24-bit, channel-to-channel isolated RTD temperature input module
- DDA-5321 (PN: JY649942601)
Distributed Data Acquisition Platform with built-in 32-channel, 16-bit, 1MS/s/channel, 16 DIO, simultaneous sampling Multifunction I/O Module
- DDA-5322 (PN: JY5222640-01)
Distributed Data Acquisition Platform with built-in 16-channel, 16-bit, 1MS/s/channel, 8 DIO, simultaneous sampling multifunction I/O module
- DDA-5323 (PN: JY2160804-01)
Distributed Data Acquisition Platform with built-in 32-channel, 16-bit, 200 kS/s/channel, 16 DIO, simultaneous sampling multifunction I/O module
- DDA-5324 (PN: JY6200498-01)
Distributed Data Acquisition Platform with built-in 16-channel, 16-bit, 200 kS/s/channel, 8 DIO, simultaneous sampling multifunction I/O module

3. DDA Product

3.1 Introduction

DDA stand for Distributed Data Acquisition. DDA Products are primarily developed based on the DDA System carrier board. The DDA System carrier board is a distributed data acquisition (DAQ) platform with similar capabilities to PCIe/PXIe-1010 boards, but it features a distinct interface design suitable for a variety of applications modules can be utilized for collecting sensor data distributed data acquisition and control systems, enhancing the flexibility and scalability of the systems. When paired with the existing daughter board from JYTEK, it can be assembled into various configurations of DAQ boards to meet different requirements.

All DDA products have two operating modes: **DDA mode** and **EDAQ mode**. In DDA mode, the program actually runs on the DDA System, operating independently without reliance on a PC host. All software drivers and applications execute directly on the DDA device, which features a customized Linux operating system; In EDAQ Mode, all software drivers actually running on the host PC., there is no difference between the EDAQ mode and traditional PCIe/PXIe/USB devices.

3.2 Pannel

3.2.1 Front Pannel

The front panel of the DDA is divided into two sections, one for the LED lights that indicate the operational status of the DDA and the other for the connectors.

Special Note: Connectors may vary among different models of DDAs, and the actual DDA product should be used as the reference.

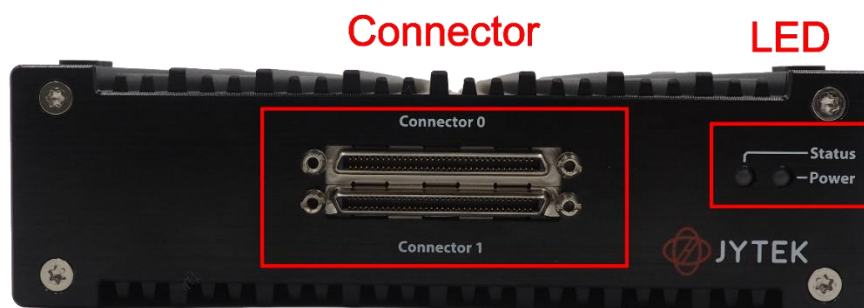


Figure 1 Front Pannel

3.2.2 Rear Panel

The rear panel of the DDA device is composed of five parts, which are the RS485 interface, RJ45 network port, USB interface, MicroSD card slot, and power supply interface. Additionally, the rear panel also includes a reset hole.



Figure 2 Rear Panel

Note: USB-C is reserved for future use.

RS485:

The connector definition for the RS485 interface is as follows: Users can choose to connect the DDA device to the factory's internal network through the RS485 interface, leveraging the excellent anti-interference capability of RS485 to achieve DDA communication in the complex environment of the factory.

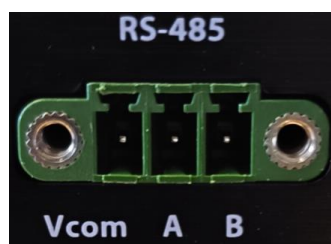


Figure 3 RS-485 Interface

RJ45:

The RJ45 interface is an 8-pin interface, through which the DDA device is connected to the Ethernet. Users can communicate with the DDA device via the TCP protocol.

USB:

The rear panel of the DDA device includes a USB 2.0 interface, which can be used for connecting external wireless network cards or other USB interface devices.

Reset:

In the event of an abnormal system condition, the DDA device can be restarted to resume normal operation using the Reset button. To initiate a reset, press and hold the Reset button with a pin for 5 to 10 seconds, which will cause the DDA device to restart and function in DHCP mode. For a reset that results in the device operating in static mode, press and hold the Reset button for more than 12 seconds. For detailed operational instructions, please refer to Section 5.1.1.

Micro SD Slot:

The Micro SD slot is used for loading SD cards and serves as the external storage for the DDA device. Consequently, the DDA device can save the lower-level machine program and the data collected by the lower-level machine onto the SD card.

Power Supply:

The DDA device supports a DC power supply of 9-36V. The power supply interface includes V+, Vcom and GND. For the interface definition, please refer to the Figure shown below.

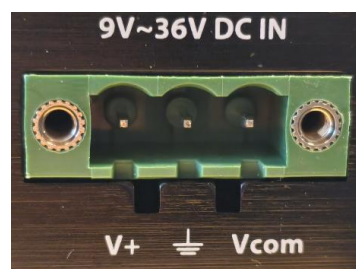


Figure 4 Power Supply

3.3 Operating DDA: DDA Mode

When operating in DDA mode, all software drivers and applications execute directly on the DDA device, which features a customized Linux operating system. To operating DDA, user should follow the operation step which is show in the figure below, the more detailed operation of DDA is introduced in section 5.1.

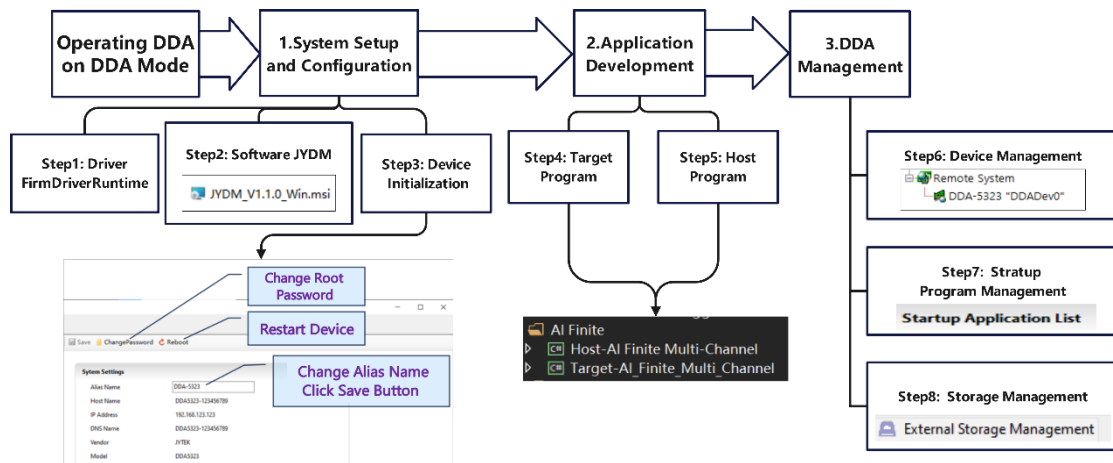


Figure 5 Operating DDA: DDA Mode

3.4 Operating DDA: EDAQ Mode

When operates in EDAQ mode, all operations are similar to those of a standard PXI/PCI DAQ. The data transmission method has simply been changed from PXI/PCIe bus to network transmission. The usage and operation process in the EDAQ mode can be referred to the figure below. The more detailed operations of EDAQ Mode are introduced in section 5.2.

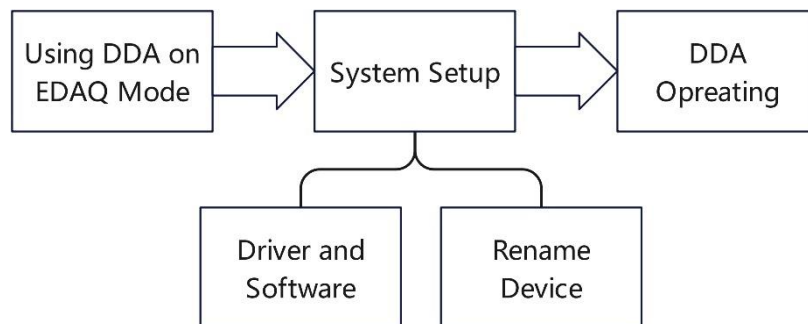


Figure 6 Operating DDA Step: EDAQ Mode

4. Software

The software development environment for DDA products is primarily completed on the Visual Studio platform. The program development for the lower machine (the device or system that interacts directly with the hardware) is mainly based on the **SeesharpMonoDebugger** template. Communication between the upper machine (the user interface or control system) and the lower machine is primarily accomplished by invoking the **SeeSharpTools.JY.TCP** class library for data transmission.

The development of software on the lower machine includes key steps such as setting the IP address, establishing login credentials, referencing the DDA driver, executing a five-step data collection procedure, and facilitating data uploads. Meanwhile, the upper machine's software development aims to achieve two core functions: the reception of data from the lower machine and the subsequent presentation and analysis of that data.

5. Operating DDA Product

This chapter provides the operation guides for JY DDA board, including **DDA Mode** operating guide and **EDAQ Mode** operating guide.

We provide many sample programs for this device. Please download the sample programs for this device. You can download a JYPEDIA excel file from our web www.jytek.com. Open JYPEDIA and search for DDA product in the driver sheet. In addition to the download information, JYPEDIA also has a lot of other valuable information, JYTEK highly recommend you use this file to obtain information from JYTEK.

The following operational section will **use DDA 5323 as an example** to demonstrate how to use DDA products for data acquisition.

5.1 DDA Mode

In DDA mode, the operation and management are divided into three parts, totaling eight steps. This chapter will provide a function introduction and operational demonstration for each step to help users quickly get started with the DDA product. Figure 5 Show the Diagram of DDA Mode

5.1.1 System Setup and Configuration

To use DDA products, you need to install some relevant drivers and software on the PC, including **JYDM version 1.1 or above** and **FirmDriveRuntime version 1.5 or above**. After that, you need to perform the **DDA Initialization** on the device using JYDM

Step1: FirmDriveRuntime

FirmDriveRuntime is JYTEK's hardware driver architecture. FirmDriveRuntime fully implements the PXI interface specification on FPGA, laying a solid foundation for the stability of JYTEK module hardware. FirmDriveRuntime has the inherent characteristic of cross-platform compatibility, allowing all JYTEK module hardware to operate under both Windows and Linux. JYTEK 's FirmDriveRuntime has been certified by Microsoft. User can download driver from website of JYTEK.

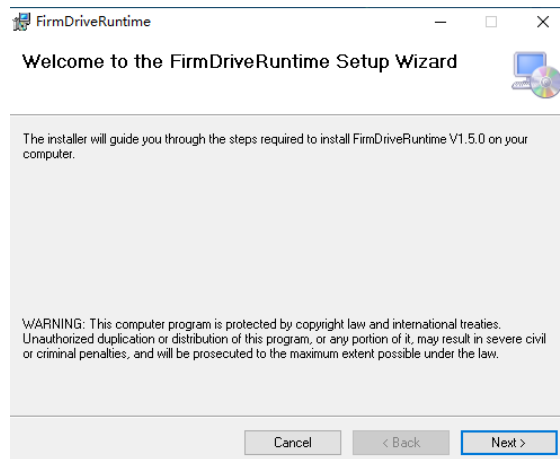


Figure 7 Install V1.5.0 or above FirmDriveRuntime

Step2: JYDM

JYDM is the device manager developed by JYTEK for devices under the PXI, PCI, USB, and TXI bus protocols, and is already connected to control DDA products. Users can utilize JYDM to manage chassis, controllers, and board that conform to the PXI specification. JYDM also provides updates and maintenance for JYTEK drivers and firmware and offers test programs for quick verification of the board. User can download JYDM from website of JYTEK.

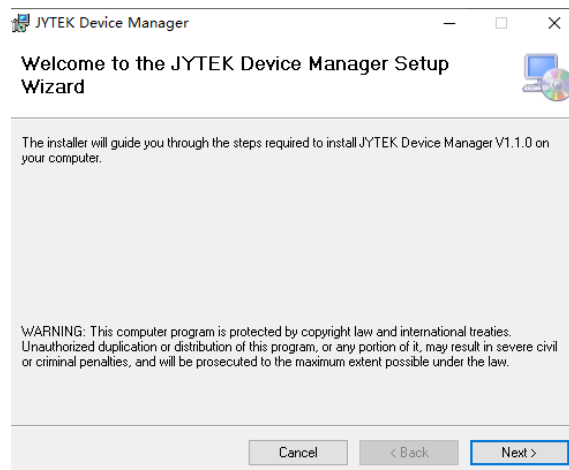


Figure 8 Install 1.1.0 or above JYDM

Step3: DDA Initialization

Before using the DDA Products, it is necessary to initialize the relevant settings for the DDA device. When using DDA for the first time, you need to configure the device's username and password, and set a device alias in JYDM to facilitate subsequent device management.

Learn by example 5.1.1

- Open JYDM, and you can find the corresponding DDA device in the device loading bar on the left side. In the right-side 'Believe Information' bar, you can view detailed information about the DDA device, including the device's alias name, IP address, FPGA model, memory, and disk information.
- There are three buttons above the status bar, and the functions they possess are shown in Figure 9.

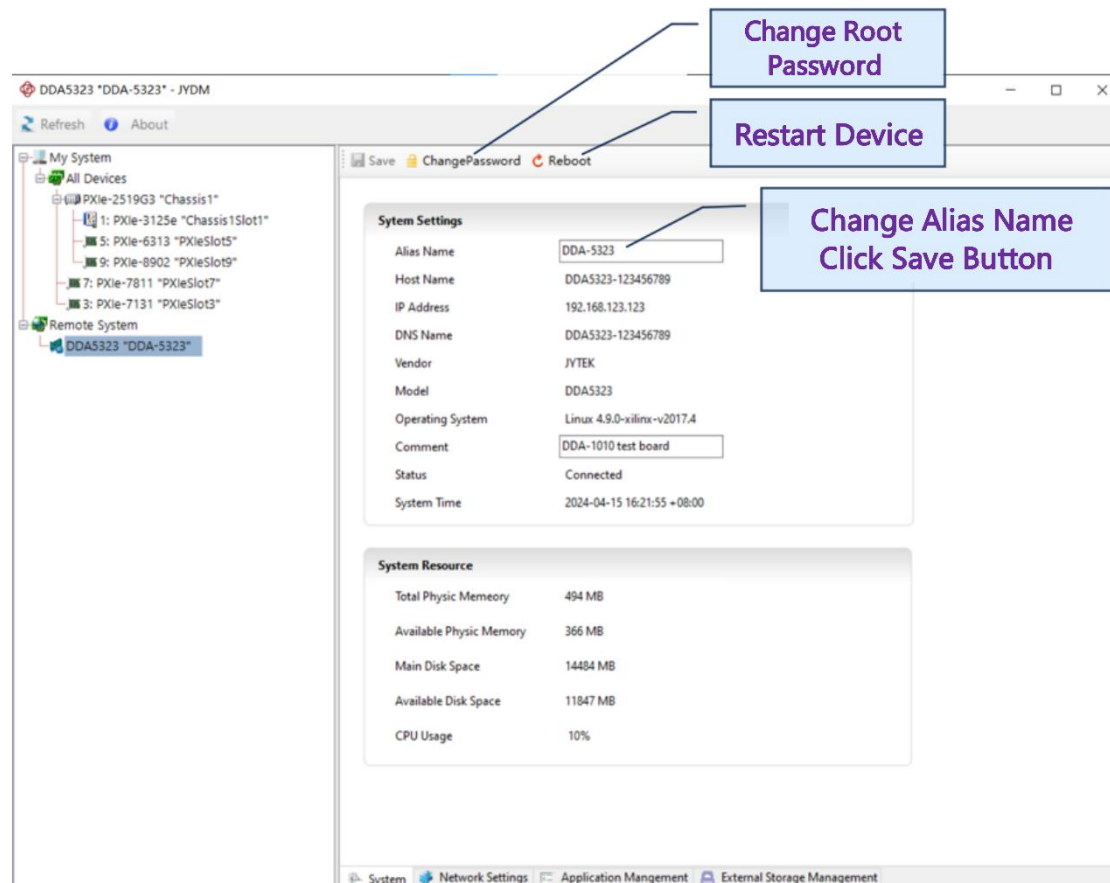


Figure 9 System Initial

Additionally, as a distributed device, the DDA hardware is deployed within the network, so it is necessary to configure the network parameters of the DDA to ensure reliable communication. IP Settings for DDA can be configured by JYDM Network Setting or pressing the Reset button on DDA device.

- Open JYDM, In the options bar below, **select "Network Setting"**, then choose "DHCP" in the "IPv4 Config". Using a dynamic IP address can provide more flexibility in establishing connections and communication between the Host and the RT Target.

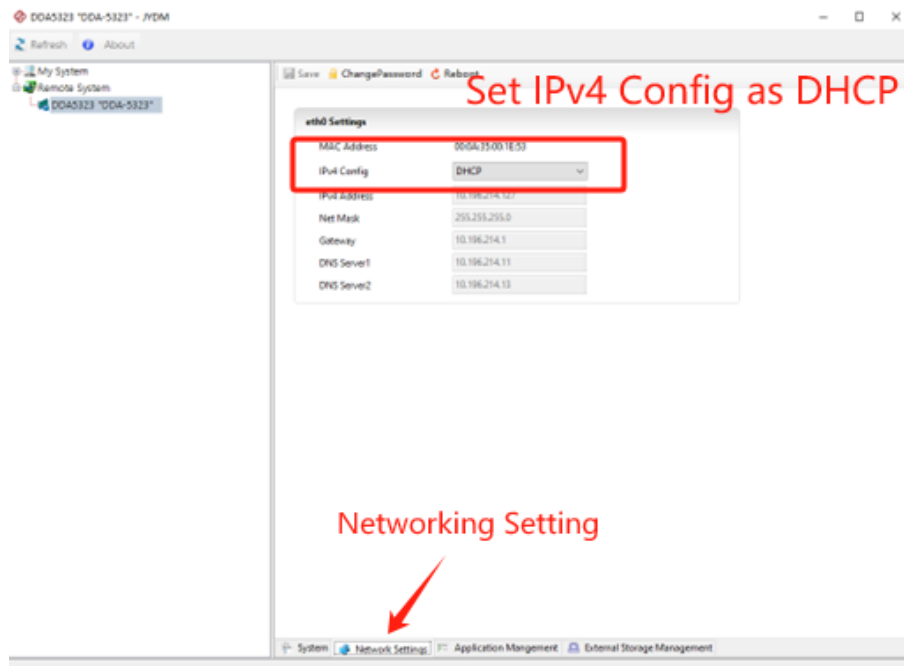


Figure 10 Select DHCP Mode

- IP Settings of DDA can be configured via the reset button. The location of the reset button is referred to Figure 2. When the reset button is pressed for 5-10 seconds, the DDA will operate in DHCP mode; when the reset button is pressed for more than 12 seconds, the DDA will operate in static mode, with the static IP being set to 169.254.1.6. After pressing the reset button, the DDA device will restart, which will take some time, and then users can re-identify the DDA device through JYDM.
- For the DHCP mode, it is suitable for integrating the DDA into an existing network. For the static mode, it is suitable for connecting the DDA device to a local network without an internet connection (for example, by directly connecting the host computer and the DDA device with an Ethernet cable).

5.1.2 Operating Target and Host Program

DDA's Application and software development is divided into the development of **Target Program** and **Host Program**, both of which are based on Visual Studio. The program development for the lower machine (the device or system that interacts directly with the hardware) is mainly based on the **SeesharpMonoDebugger** template. Communication between the upper machine (the user interface or control system) and the lower machine is primarily accomplished by invoking the **SeeSharpTools.JY.TCP** class library for data transmission.

Step4: Target Program

The development of software on the lower machine includes key steps such as setting the IP address, establishing login credentials, referencing the DDA driver, executing data collection procedure and facilitating data uploads.

```
//配置参数
aiTask.Mode = (JY5320.AIMode)Enum.Parse(typeof(JY5320.AIMode), param.Mode.ToString());
aiTask.SampleClock.Source = (JY5320.AISampleClockSource)Enum.Parse(typeof(JY5320.AISampleClockSource), param.SampleClock.Source.ToString());
if (aiTask.SampleClock.Source == JY5320.AISampleClockSource.External)
{
    aiTask.SampleClock.External.Terminal = (JY5320.ClockTerminal)Enum.Parse(typeof(JY5320.ClockTerminal), param.SampleClock.External.Terminal.ToString());
    aiTask.SampleClock.External.ExpectedRate = param.SampleRate;
}
else
{
    aiTask.SampleRate = param.SampleRate;
}
aiTask.SamplesToAcquire = param.SamplesToAcquire;
aiTask.DisableCalibration = true;
data = new double[param.SamplesToAcquire, param.ChannelCount];
//开始任务
```

Figure 11 Target program development

Step5: Host Program


The Host Program development aims to achieve two core functions: the reception of data from the lower machine and the subsequent presentation and analysis of that data.

```
private void timer1_Tick(object sender, EventArgs e)
{
    timer1.Enabled = false;

    if (_dataClient.AvailableSamples >= dataBuffer.Length*sizeof(double))
    {
        //读取下位机传回的数据,转置后绘制在easyChartX上
        _dataClient.ReadData(ref dataBuffer, 10000);
        easyChartX1.Plot(dataBuffer, 0, 1, SeeSharpTools.JY.GUI.MajorOrder.Column);
    }
    timer1.Enabled = true;
}
```

Figure 12 Host Program development

We provided examples of both the upper-level and lower-level machine programs for DDA to facilitate users' quick start. Please Download **DDA-5323 Examples.zip** from JYPEDIA first.



Drivers	Update Date	Category	Support Module
DDA6312 V1.0.0 Examples.rar	2024/7/19	Example	6312
DDA5323 V1.0.0 Examples.rar	2024/7/19	Example	5323
DDA9515 V1.0.0 Examples.rar	2024/7/19	Example	9515

Figure 13 Download DDA-5323 Example

Learn by example 5.1.2

- Connect the signal source's positive outputs to DDA-5323 AI Ch0 (AI0+, Pin #45) negative terminals to the ground (AI0-, Pin#11).
- Set a sinewave signal (f=2KHz, Vpp=10V).
- Open **Analog Input-->Winform AI Continuous** project. Each file contains a host project and target project. The RT Target is configured into the DDA device to perform data acquisition tasks. The Host task is to obtain the data collected by the Target through communication connections.

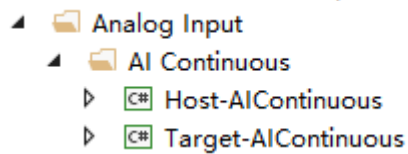


Figure 14 Host and Target program

- Select the target task, right-click to enter the properties interface, choose RemoteHost, and enter the correct IP address, as well as the username and password. Then, start Target task.

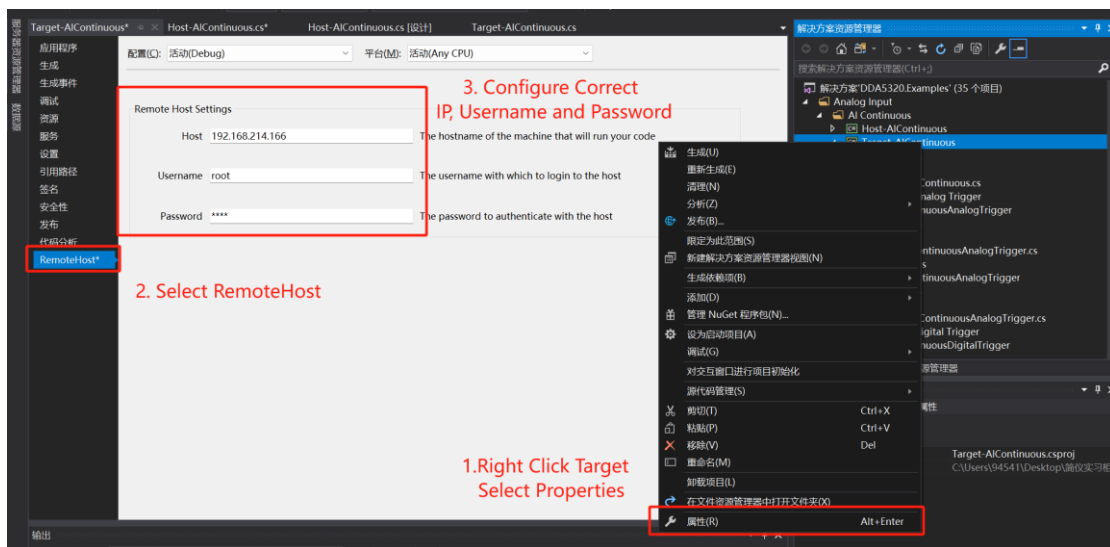


Figure 15 Target Configuration

- Launch the Host program, and when both identify the online status, the output will display 'wait host connect'.

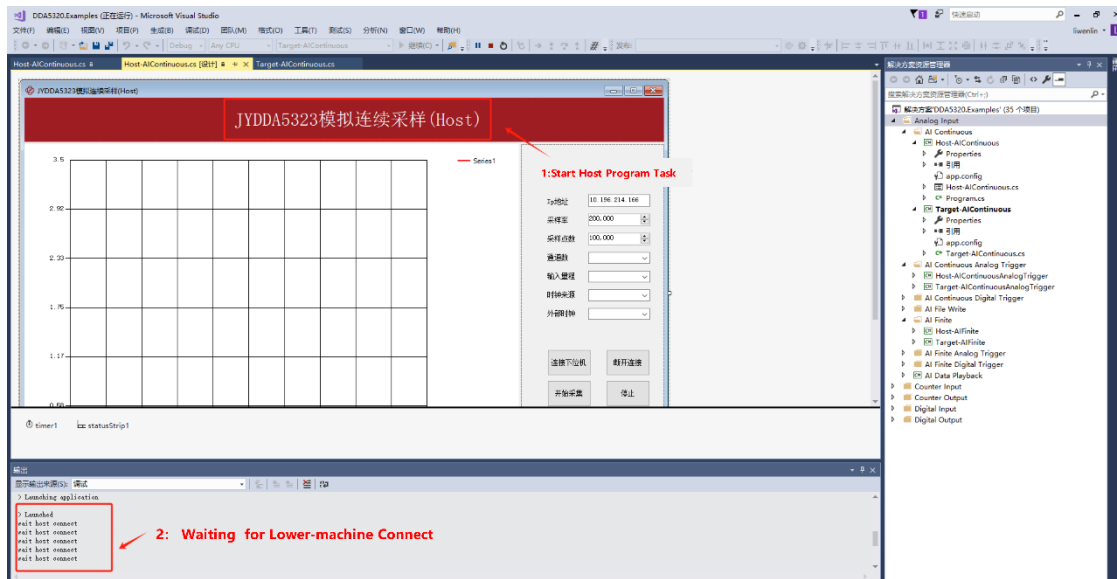


Figure 16 Start Host Program

- Click the button to connect to the RT Target task. After a successful connection, it will display 'wait for commands'. Then click the button to start data acquisition.

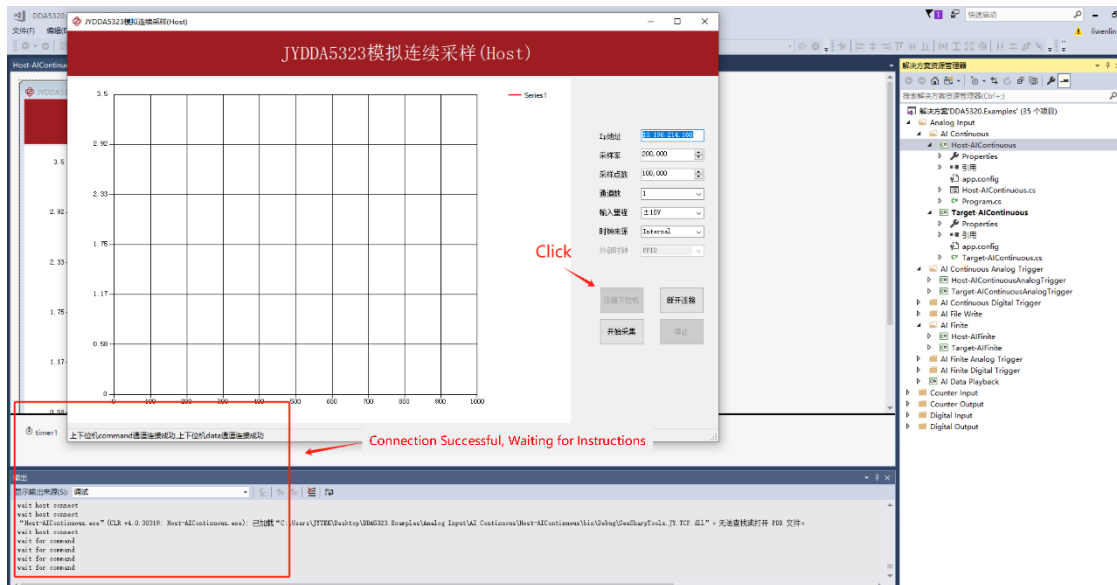


Figure 17 Connect Host task and Target task

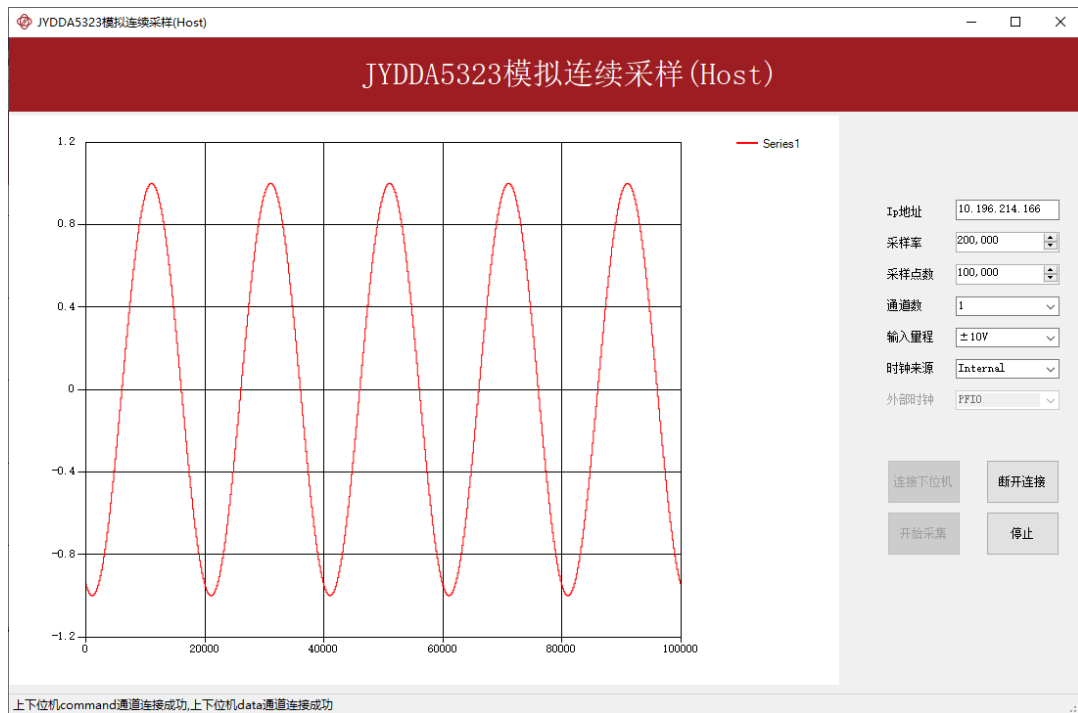


Figure 18 Data acquisition

5.1.3 DDA Management

As a distributed device, users can manage all DDA devices through JYDM. Users can perform **Device Management**, **Startup Management** and **External Storage management** via JYDM.

Step6: Device Management

The host computer can identify all DDA devices within the same network segment through JYDM. These devices will be displayed in the Remote System bar on the left side of the interface, and users can click on the corresponding device to perform more operation settings.

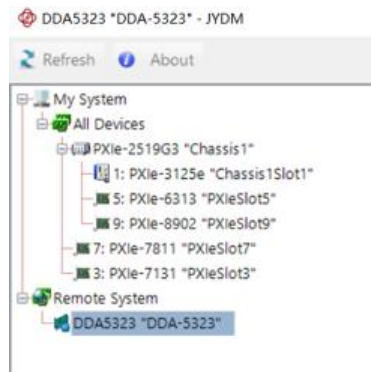


Figure 19 Device management

Step7: Startup Management

Users can set the DDA Target startup program through JYDM. After the startup program settings are completed, user can start lower-level machine program through JYDM, and Host Computer can read the collected data from the DDA through the upper-level machine program which including TCP connection.

Learn by Example 5.1.3-1

- Select "Application Management" in the options bar below, choose the exe application that the lower machine needs to run, and then use the class library **SeeSharpTools.JY.TCP** on the Host to establish a connection and communicate with the RT Target, receiving the data collected by the RT Target.

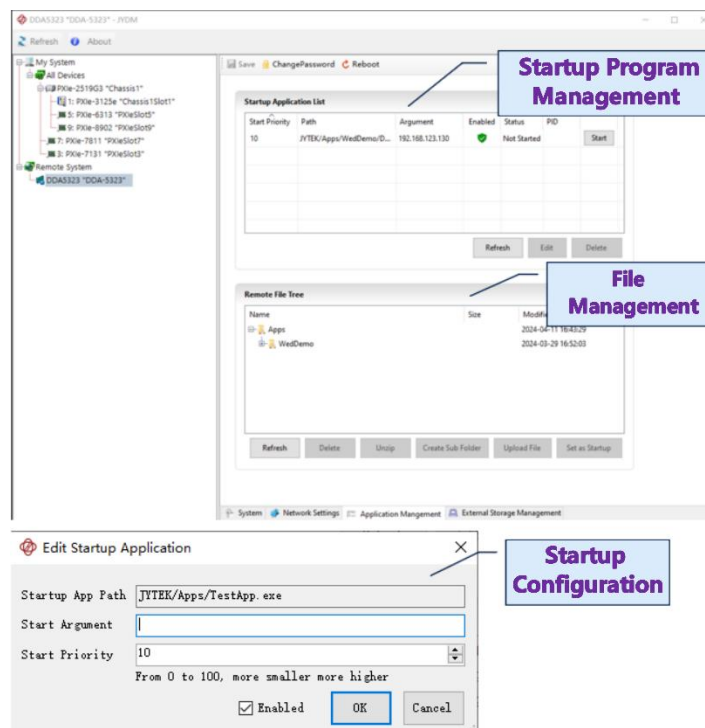


Figure 20 Startup Management

- Connect the signal source's positive outputs to DDA-5323 AI Ch1 (AI1+, Pin #47) negative terminals to the ground (AI1-, Pin#13).
- Set a sinewave signal ($f=2\text{KHz}$, $V_{pp}=6\text{V}$).
- Clicking the "Start" button to the right of the startup item program can initiate the data acquisition program on the RT Target. If you wish to terminate the program, you can click the "Kill" button.

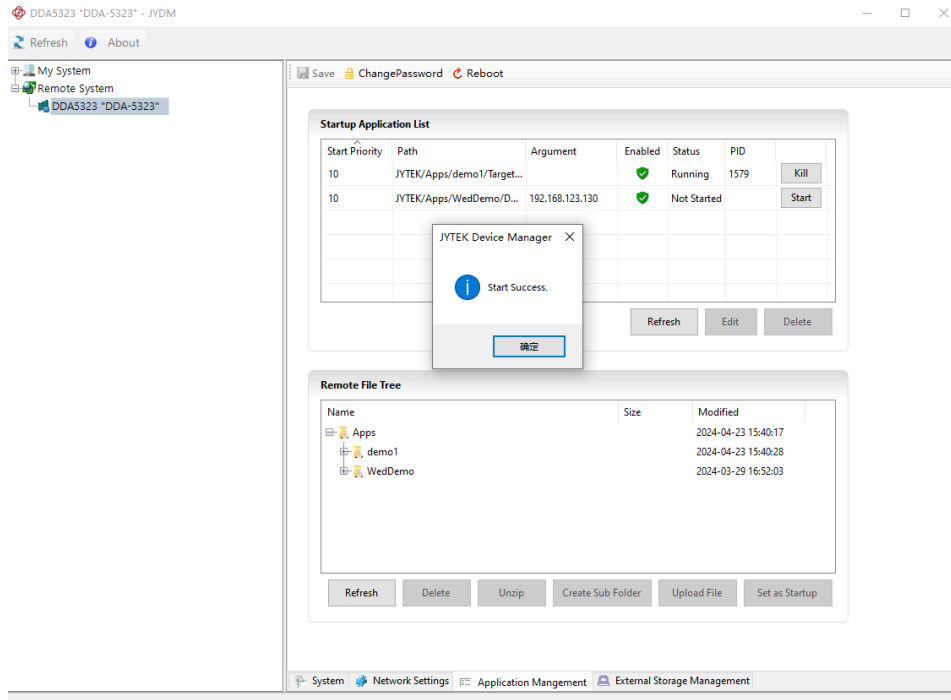


Figure 21 Start RT Target Task

- After starting the RT Target program in JYDM, we can read the data collected by the RT Target through the Host's TCP communication program.

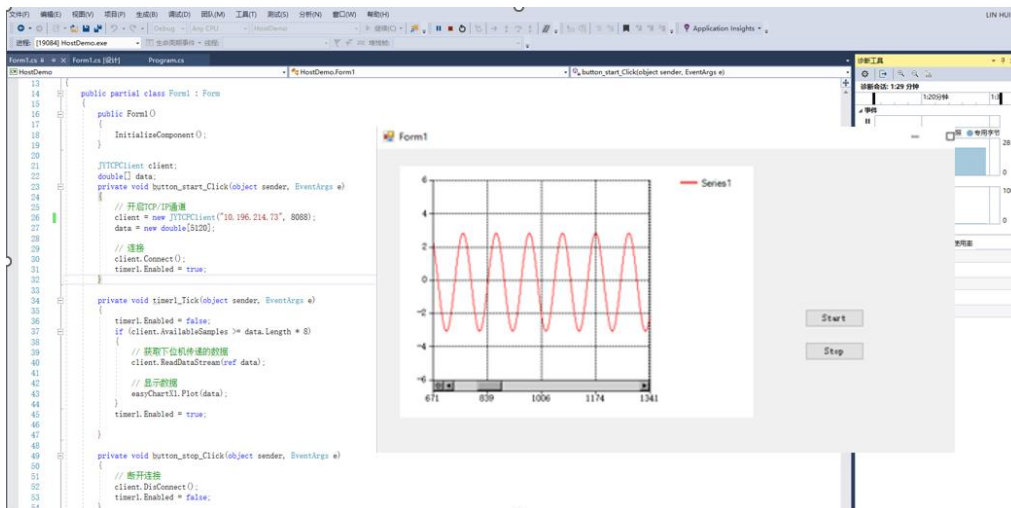


Figure 22 Host Receive Data from RT Target

Step8: External Storage management

The DDA module features an SD card slot designed for file and program storage. Utilizing JYDM version 1.1 or later, users can efficiently configure and manage these files and programs. Capabilities within JYDM include managing DDA module-related system files by creating folders, uploading programs to the lower machine, and deleting folders. The DDA module is also capable of handling external file storage and manage, including the uploading and downloading of files.

Learn by example 5.1.3-2

- While the RT Target program is running for data acquisition, the collected data will be synchronized and stored in a CSV file. This file will be saved on the SD card located inside the DDA module. We can **select "External Storage Management "** in the options for the DDA product on JYDM, where the files containing the saved data are stored. By right-clicking on the corresponding file, we can either download it to the PC or delete it from the SD card.

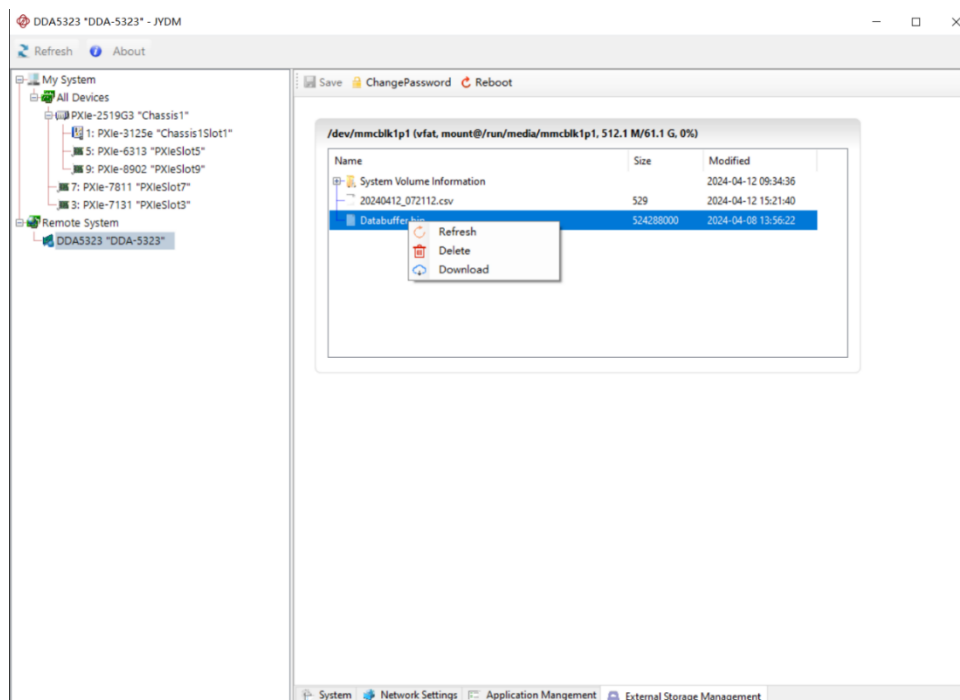


Figure 23 Files Storage Management

5.2 EDAQ Mode

In EDAQ mode, the operation and management are divided into 2 parts. This chapter will provide a function introduction and operational demonstration for each part to help users quickly get started with the DDA product. Figure 6 Show the Operation Diagram of EDAQ Mode

5.2.1 System Setup (EDAQ Mode)

The Driver and Software is same as DDA Mode which including Driver FirmDriverRuntime and Software JYDM, user can get more details from Section 5.1.1

It is important to note that when using the EDAQ mode, each device must be individually assigned an alias in JYDM.

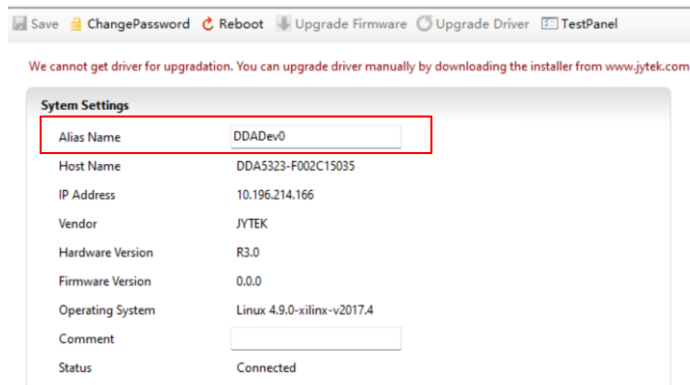


Figure 24 System Setup (EDAQ Mode)

5.2.2 DDA Operating (EDAQ Mode)

The use of DDA under EDAQ is completely consistent with the use of ordinary PXI/PCI bus DAQ. Specific parameters and instructions can be referred to in the manual of the same model. It is particularly important to note that when using the same model DAQ example, device aliases should be used for the selection of DDA devices.

In EDAQ mode, user can directly use the standard examples of the module. Download **JY5320 Examples.zip** from JYPEDIA.



Drivers	Update Date	Category
JY5320 V1.1.3 Win.tar	2024/7/19	Driver
JY5320 V1.1.2 Linux.tar	2024/4/26	Driver
JY5320 V1.1.2 Examples.rar	2024/4/26	Example
JY5320 V1.0.8 C++Examples.rar	2024/3/8	Example
JY5320 V1.0.1 Python.rar	2023/8/4	Driver
JY5320 V1.0.1 PythonExamples.rar	2023/8/4	Example

Figure 25 Download JY5320 Example

Learn by example 5.2.2

- Connect the signal source's positive outputs to DDA-5323 AI Ch1 (AI1+, Pin #47) negative terminals to the ground (AI1-, Pin#13).
- Set a sinewave signal (f=2KHz, Vpp=10V).
- Open **Analog Input-->Winform AI Continuous** project, modify the initialization task part of the code to start the board using an alias name of DDA product, set the following numbers as shown.

```
try  
{  
    //New AI task based on the selected Solt Number  
    aiTask = new JY5320AITask("DDA-5323");  
    //Addchannel  
    aiTask.AddChannel(comboBox_channelNumber.SelectedIndex, lowRange, highRange);  
    //Basic parameter configuration  
    aiTask.Mode = AIMode.Continuous;  
    aiTask.SampleClock.Source = (AISampleClockSource)Enum.Parse(typeof(AISampleClockSource), comboBox_sampleClock.Text, true);  
}
```

Modify to DDA alias name

Figure 26 Modify Alias Name in Example

Figure 27 JY-5320 Example Winform

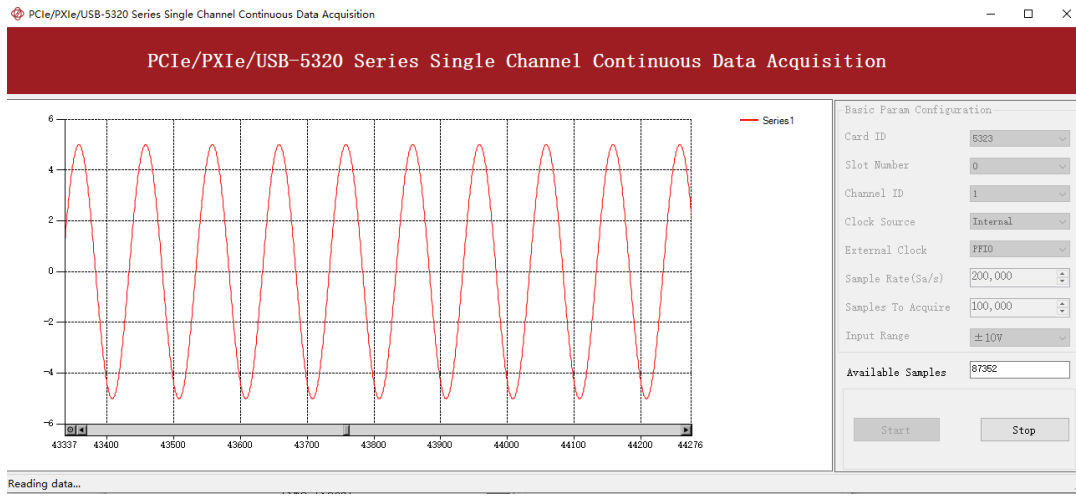


Figure 28 EDAQ Mode Display

6. About JYTEK

6.1 JYTEK China

Founded in June, 2016, JYTEK China is a leading Chinese test & measurement company, providing complete software and hardware products for the test and measurement industry. The company has evolved from re-branding and reselling PXI(e) and DAQ products to a fully-fledged product company. The company offers complete lines of PXI, DAQ, USB products. More importantly, JYTEK has been promoting open-sourced based ecosystem and offers complete software products. Presently, JYTEK is focused on the Chinese market. Our Shanghai headquarters and production service center have regular stocks to ensure timely supply; we also have R&D centers in Xi'an and Chongqing. We also have highly trained direct technical sales representatives in Shanghai, Beijing, Tianjin, Xi'an, Chengdu, Nanjing, Wuhan, Guangdong, Haerbin, and Changchun. We also have many partners who provide system level support in various cities.

6.2 JYTEK Software Products

JYTEK has developed a complete software platform, SeeSharp Platform, for the test and measurement applications. We leverage the open sources communities to provide the software tools. Our platform software is also open sourced and is free, thus lowering the cost of tests for our customers. We are the only domestic vendor to offer complete commercial software and hardware tools.

6.3 JYTEK Warranty and Support Services

With our complete software and hardware products, JYTEK is able to provide technical and sales services to wide range of applications and customers. In most cases, our products are backed by a 1-year warranty. For technical consultation, pre-sale and after-sales support, please contact JYTEK of your country.

7. Statement

The hardware and software products described in this manual are provided by JYTEK China, or JYTEK in short.

This manual provides the product review, quick start, some driver interface explanation for DDA Series family of multi-function data acquisition and modular instruments boards. The manual is copyrighted by JYTEK.

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Shanghai Jianyi Technology Co., Ltd.

Address: Room 201, Building 3, NO.300 Fangchun Road, Shanghai.

Post Code: 201203

Tel: 021-5047 5899

Website: www.jytek.com