1 PCIe/PXIe-9818 Specifications

Please download JYTEK <JYPEDIA>, you can quickly inquire the product prices, the key features and available accessories.

Overview

The JY-9818 PXI Express digitizer provides high speed, high quality data acquisition. Each of 8 input channels supports up to 125MS/s sampling, with up to 16-bit resolution. This allows simultaneous recording of signals on all channels with no inter-channel phase delay. The extremely large onboard memory enables long recording times even at the highest sampling rates.

The PCIe/PXIe-9818 features flexible input ranges of ±0.5V, ±1V, ±5V, and ±10V along with software selectable 50 Ω or 1MΩ input impedance. Four high resolution 16-bit A/D converters combine with a low-noise/high bandwidth analog front-end to make the PXIe-9818 perfect for applications like radar signal acquisition, fiber optic sensing, and many others.

1.1 Main Features

- 8 simultaneous analog inputs
- Maximum 125 MS/s sample rates
- Up to 80 MHz bandwidth for analog input
- Up to 0.49% of full scale DC accuracy
- 16-bit High resolution
- 512MB onboard storage memory
- Programmable input voltage range of ±0.5V, ±1V, ±5V, or ±10V
- Scatter-Gather DMA data transfer for high speed data streaming
- Supports external reference clock (10MHz)
- Software selectable 50Ω or 1MΩ input impedance

1.2 Analog Input

Analog Input	JY-9818
Resolution (Bits)	16
Sampling Rate(Per Channel)	2 KS/s~125 MS/s
Sample Rate resolution (2KS/s~125MS/s)	100 ppm
Number of Input channels	8
Sample Clock Source	Internal, software selectable
Input range(V)	±0.5/±1/±5/±10
Input mode	RSE
Input impedance	50 Ω /1 MΩ, software selectable
Input coupling	DC / AC, software selectable
Crosstalk(@1 MHz)[1]	-85 dB
Operating Temperature	0 ºC～ 50 ºC
Input FIFO	256 M Samples
Trigger Type	Analog/Digital/Software
Trigger Mode	StartTrigger,ReferenceTrigger,ReTrigger
Interval of retrigger	5 Samples
Guaranteed Bandwidth (-3 dB)	50 MHz
Maximum input overload	7Vrms, For 50Ω:±0.5V or ±1V or ±5V input range
	±10V, For 1MΩ: ±0.5V or ±1V input range
	±30V, For 1MΩ: ±5V or ±10V input range
Input current during overvoltage protection	±20 mA
Crosstalk(@1 MHz)1	

Table 1 Analog Input Specifications

1.3 DC Accuracy

Input Impedance: 50 Ω

JY-9818 Basic Accuracy = ±(% Reading+% Range)				
Nominal Range (V)	24 Hour Tcal ±1°C	90 Days Tcal±5°C	Temperature Coefficients(/°C)	24 Hr Full Scale Accuracy	90 Days Full Scale Accuracy
0.5	0.26 + 0.21	1.00 + 0.25	0.021 + 0.006	2.4 mV	6.3 mV
1	0.25 + 0.15	1.00 + 0.25	0.019 + 0.005	4 mV	13.0 mV
5	0.25 + 0.18	1.00 + 0.25	0.019 + 0.005	22 mV	63 mV
10	0.24 + 0.15	1.00 + 0.25	0.017 + 0.003	39 mV	125 mV

Accuracy valid to 95% of full range

Sampling rate 125MSa/s

Input Impedance: 1 MΩ

JY-9818 Basic Accuracy = ±(% Reading+% Range)				
Nominal Range (V)	24 Hour Tcal ±1°C	90 Days Tcal±5°C	Temperature Coefficients(/°C)	24 Hr Full Scale Accuracy	90 Days Full Scale Accuracy
0.5	0.26 + 0.20	0.35 + 0.18	0.022 + 0.006	2.3 mV	2.7 mV
1	0.22 + 0.15	0.32 + 0.18	0.020 + 0.004	3.7 mV	5.0 mV
5	0.22 + 0.15	0.32 + 0.17	0.020 + 0.004	19 mV	25 mV
10	0.21 + 0.15	0.32 + 0.17	0.019 + 0.003	36 mV	49 mV

Accuracy valid to 95% of full range

Sampling rate 125MSa/s

Table 2 DC Accuracy of JY-9818

1.4 AC Accuracy

Normal Range (V)	Max Sample Rate (MS/s)	Input Impedance	AC Accuracy (db)	AC Accuracy (%)
0.5	125	50 Ω	0.15	1.7
1	125	50 Ω	0.15	1.7
5	125	50 Ω	0.2	2.3
10	125	50 Ω	0.2	2.3
0.5	125	1 MΩ	0.04	0.5
1	125	1 MΩ	0.04	0.5
5	125	1 MΩ	0.08	0.9
10	125	1 MΩ	0.08	0.9
Test condition： For a 50 kHz signal with amplitude 90% of full-scale input range measured within,125Msps				

Table 3 AC Accuracy of JY-9818

1.5 AI Bandwidth

Normal Range (V)	Max Sample Rate (S/s)	Impedance (Ohm)	Bandwidth -3dB (MHz)
0.5	125M	50	73
1	125M	50	80
5	125M	50	72
10	125M	50	80
0.5	125M	1M	65
1	125M	1M	72
5	125M	1M	68
10	125M	1M	75

Table 4 AI Bandwidth

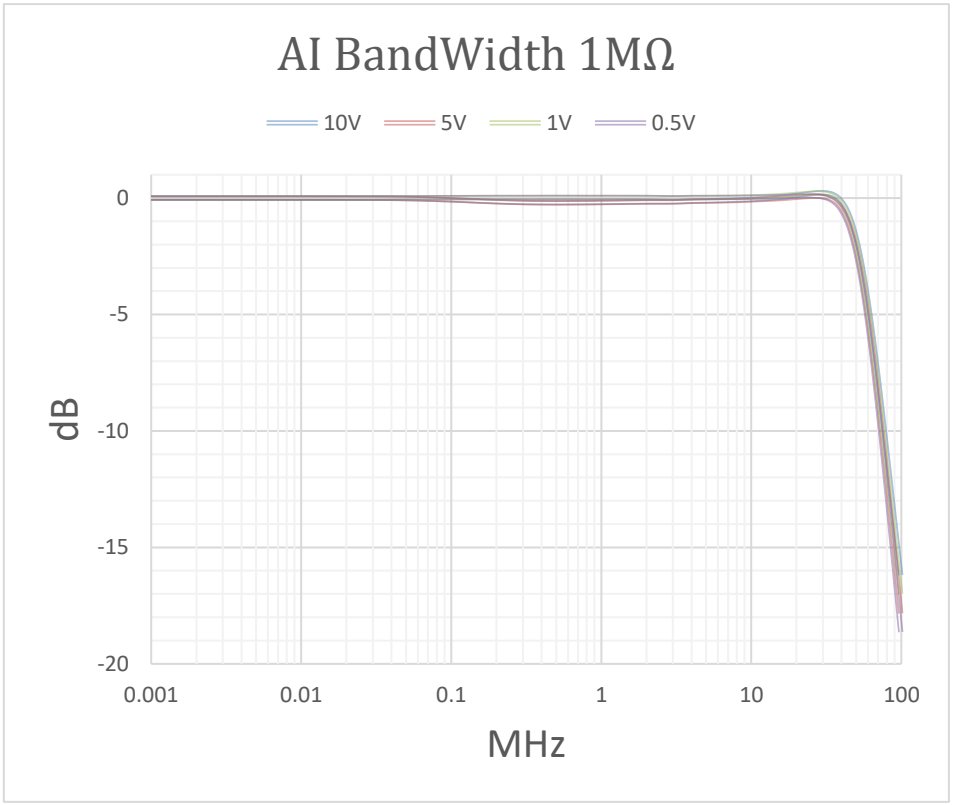

Figure 1 AI Bandwidth with 1MΩ

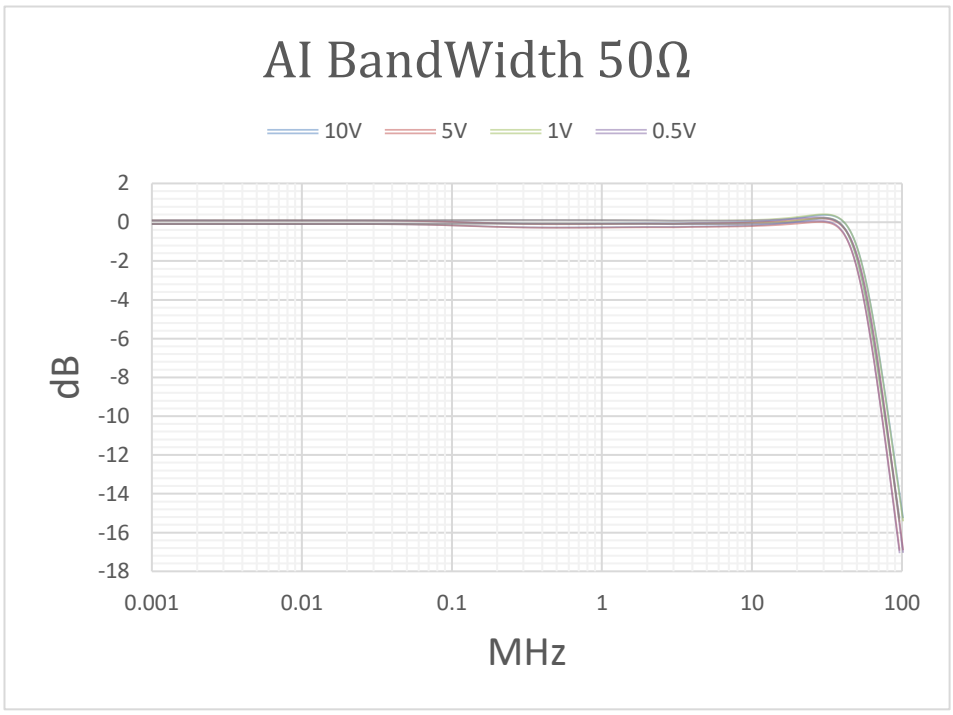

Figure 2 AI Bandwidth with 50Ω

1.6 Dynamic Performance

Normal Range (V)	Max Sample Rate (S/s)	Impedance (Ohm)	THD (dBc)	SINAD (dB)	SFDR (dBc)
0.5	125M	50	-85	68	86
1	125M	50	-85	68	84
5	125M	50	-82	68	84
10	125M	50	-82	68	84
0.5	125M	1M	-85	68	86
1	125M	1M	-85	68	84
5	125M	1M	-82	68	84
10	125M	1M	-82	68	84

Table 5 Dynamic Performance of 9818

1.7 Multiple JY-9818 Synchronization Accuracy

<= 500 ps.

1.8 Crosstalk

Crosstalk(@1 MHz)[1]	-85dB
1: :Fin=1MHz,90%Full range,sine;	

Table 6 Crosstalk

1.9 Noise

Normal Range (V)	Max Sample Rate (S/s)	Impedance (Ohm)	Idle Channel Noise (mVrms)
0.5	125M	50	0.12
1	125M	50	0.23
5	125M	50	1.25
10	125M	50	2.35
0.5	125M	1M	0.12
1	125M	1M	0.23
5	125M	1M	1.25
10	125M	1M	2.35

Table 7 Noise of 9818

1.10 PFI Specifications

Sources	Software, External digital trigger, Analog trigger from CH0 to CH3, PXI Trigger Bus [0..7], PXI STAR Trigger, PXIe_DSTARB	
Trigger Modes	Post trigger, Pre-trigger, Middle trigger, Delay trigger, Re-trigger for post-trigger and delay-trigger modes	
External Digital Trigger	Input:	
	Input type	SMB
	Compatibility	3.3 V TTL, 5V tolerant
	impedance	50kΩ
	Input high threshold (VIH)	2.0 V
	Input Low threshold (VIL)	0.8 V
	Maximum input overload	-0.5 V ~ +5.5 V
	Impedance	50 kΩ
	External digital trigger	Trigger edge: Rising/Falling , software selectable
	Trigger pulse width	20 ns minimum
	Output:	
	impedance	50Ω
	Logic type	3.3V TTL
	Maximum drive current	24mA

Table 8 PFI0 Specifications

1.11 Timebase

Internal sample clock	20~125MS/s	
External reference clock	Connector type	SMB
	External Reference Clock	10 MHz
	Clock input range	0.45Vpp to 5Vpp
	Clock input coupling	AC
	Clock input impedance	50Ω
	Duty cycle tolerance	45% to 55%
External sample clock	Connector type	SMA
	Sampling Clock	20~125MHz
	Clock input range	0.45Vpp to 5Vpp
	Clock input coupling	AC
	Clock input impedance	50Ω
	Duty cycle tolerance	45% to 55%

Table 9 Timebase specification of 9818

1.12 Onboard Reference

Recommended warmup time	15 minutes

Table 10 Onboard Reference

1.13 Data Storage and Transfer

Onboard memory	512MB, shared among four analog inputs
Transfer mode	Scatter-Gather DMA data transfer

Table 11 Data Storage and Transfer

1.14 Connector

Connector type: SMB

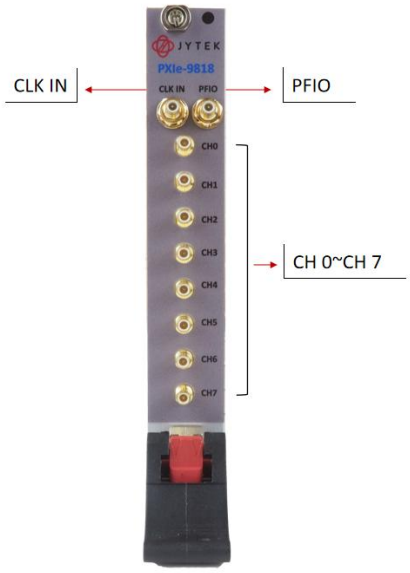

Figure 3 JY-9818 Front Panel

1.15 Maximum Power Consumption

Power rail	current draw
+3.3V	70 mA
+12V	753 mA
Total Power	9.28W

Table 12 Physical and Environment

1.16 Physical and Environment

Bus

PXIe standard	x4 PXI Express peripheral module Specification V1.0 compliant
Slot supported	x1 and x4 PXI Express or PXI Express hybrid slots

Size

External physical size	3 U PXIe
Weight	190 g

Operating Temperature

Operating ambient temperature range	0-55 °C

Storage Environment

Ambient temperature range	-20°C to 80°C
Relative humidity range	10% to 90%, noncondensing

Dimensions:	3U, one-slot, PXI Express, 165 (W) x 100 (H) mm
Bus interface:	PXI Express Gen2 x 4
Operating ambient temperature:	0° C to 50° C (32° F to 122° F)
Storage ambient temperature:	-20℃ to 80℃ (-4℉ to 176℉)
Relative humidity for operating & storage:	5% to 95%, noncondensing

Table 13 Physical and Environment

Table of Contents

2 Software

2.1 System Requirements

JY-9818 modules can be used in a Windows or a Linux operating system.

Microsoft Windows: Windows 7 32/64 bit, Windows 10 32/64 bit. We highly recommend the user to use Windows 10 whenever possible.

Linux Kernel Versions: There are many Linux versions. It is not possible JYTEK can support and test our devices under all different Linux versions. JYTEK will at the best support the following Linux versions.

Linux Version
Ubuntu LTS
16.04： 4.4.0-21-generic(desktop/server)
16.04.6：4.15.0-45-generic(desktop) 4.4.0-142-generic(server)
18.04： 4.15.0-20-generic(desktop) 4.15.0-91-generic(server)
18.04.4：5.3.0-28-generic (desktop) 4.15.0-91-generic(server)
Localized Chinese Version
中标麒麟桌面操作系统软件（兆芯版）V7.0（Build61）: 3.10.0-862.9.1.nd7.zx.18.x86_64
中标麒麟高级服务器操作系统软件V7.0U6: 3.10.0-957.el7.x86_64

Table 14 Supported Linux Versions

2.2 System Software

When using JY-9818 board in the Window environment, you need to install the following software from Microsoft:

Visual Studio Version 2015 or above,

.NET version is 4.0 or above.

.NET is coming with Windows 10. For Windows 7, please check .NET version and upgrade to 4.0 or later version.

Given the resources limitation, JYTEK only tested JY-9818 modules with .NET 4.0 with Visual Studio 2015. JYTEK relies on Microsoft to maintain the compatibility for the newer versions.

2.3 C# Programming Language

All JYTEK default programming language is Microsoft C#. This is Microsoft recommended programming language in Visual Studio and is particularly suitable for the test and measurement applications. C# is also a cross platform programming language.

2.4 C ++ Programming Language

JYTEK provides QT C++ drivers for C++ programmers. We also provide many QT C++ examples. However, due to our limited resources, we do not support C++ based applications.

2.5 JY-9818 Hardware Driver

After installing the required application development environment as described above, you need to install the JY-9810 hardware driver of PCIe/PXIe-9818 in JYPEDIA files.

JYTEK hardware driver has two parts: the shared common driver kernel software (FirmDrive) and the hardware specific driver software.

Common Driver Kernel Software (FirmDrive): FirmDrive is the JYTEK's kernel software for all hardware products of JYTEK instruments. You need to install this kernel software before using any other JYTEK hardware products. FirmDrive only needs to be installed once. After that, you can install the hardware specific driver.

Hardware Specific Driver: Each JYTEK hardware has a C# hardware specific driver. This driver provides rich and easy-to-use C# interfaces for users to operate various JY-9818 function. JYTEK has standardized the ways JYTEK and other vendor's DAQ cards are used by providing a consistent user interface, using the methods, properties and enumerations in the object-oriented programming environment. Once you get yourself familiar with how one JYTEK DAQ card works, you should be able to know how to use all other DAQ hardware using the same methods.

2.6 Install the SeeSharpTools from JYTEK

To efficiently and effectively use JY-9818 boards, you need to install a set of free C# utilities from JYTEK SeeSharp Test and Measurement platform. The SeeSharp platform offers rich user interface functions you will find convenient in developing your applications. They are also needed to run the examples come with JY-9818 hardware.

Please register and down load the latest SeeSharpTools from our website www.jytek.com.

2.7 Running C# Programs in Linux

Most C# written programs in Windows can be run by Microsoft Mono development system in a Linux environment. You would develop your C# applications in Windows using Visual Studio. Once it is done, run this application in the Mono environment. This is JYTEK recommended way to run your C# programs in a Linux environment.

If you want to use your own Linux development system other than Mono, you can do it using our Linux driver. However, JYTEK does not have the capability to support the Linux applications. JYTEK completely relies upon Microsoft to maintain the cross-platform compatibility between Windows and Linux using Mono.

3 Order Information

- PXIe-9818 (PN: JY1233714-01)
  8-CH 16-Bit 125MS/s High-Speed PXIe Digitizer
- PCIe-9818 (PN: JY1233714-01)
  8-CH 16-Bit 125MS/s High-Speed PCIe Digitizer

4 JYPEDIA

JYPEDIA is an excel file. It contains JYTEK product information, pricing, inventory information, drivers, software, technical support, knowledge base etc. You can register and download a JYPEDIA excel file from our web www.jytek.com. JYTEK highly recommends you use this file to obtain information from JYTEK.

5 Additional Hardware Information

5.1 DC Accuracy

DC voltage measurement refers to the measurement of a slowly changing voltage. The accuracy of the DC measurement is affected by gain error and offset error. An instrument's DC accuracy is defined by the gain and offset errors as follows:

Accuracy = Gain Error (% of reading) + Offset Error (% of range)

Equation 1 Gain and Offset Errors

It should be noted when the reading is close to zero, the gain error is very small and negligible, the offset error is dominant; when the reading is getting close to the full range, the gain error becomes more significant.

The AI DC Accuracy of JY-9818 is shown in Table 2.

5.2 AC Accuracy

The accuracy of the AC voltage measurement is represented by the percentage of the RMS value of the input AC signal. The AC Accuracy of JY-9818 is shown in Table 3.

5.3 Dynamic Performance

JY-9818 offers excellent dynamic performances as shown in Table 5, where THD stands for the total harmonic distortion; SINAD stands for Signal-to-Noise And Distortion; SFDR stands for Spurious-Free Dynamic Range.

6 Additional Software Information

6.1 System Requirements

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6.4 C ++ Programming Language

JYTEK provides QT C++ drivers for C++ programmers. We also provide many QT C++ examples. However, due to our limited resources, we do not support C++ based applications.

6.5 Python

JYTEK provides and supports a native python driver for JY-9818 card. There are many different versions of Python. JYTEK has only tested in CPython version 3.5. There is no guarantee that JYTEK python drivers will work correctly with other versions of Python. If you want to be our partner to support different Python platforms, please contact us.

7 Operating JY-9818

This manual provides information on how to use the JY-9818 of digitizers. It assumes that the user is already familiar with Microsoft Visual Studio and C# programming language.

7.1 Installing JY-9818 Hardware Driver

After installing the required application development environment as described above, you need to install the JY-9810 series hardware driver to use JY-9818.

JYTEK hardware driver has two parts: the shared common driver kernel software (FirmDrive) and the hardware specific driver software.

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8 Calibration

JYTEK 9818 board are precalibrated before the shipment. We recommend you recalibrate JY-9818 board periodically to ensure the measurement accuracy. A commonly accepted practice is one year. If you need to recalibrate your board, please contact JYTEK.

9 Appendix

9.1 Abbreviations

- AI: Analog Input
- ADC: Analog-to-Digital Conversion
- PFI: Programmable Function Interface
- THD: Total Harmonic Distortion
- SINAD: Signal to Noise and Distortion Ratio
- SFDR: Spurious Free Dynamic Range

9.2 What is a digitizer and how does it work?

A digitizer, also known as a data acquisition system, is an electronic instrument that captures and records signals from a variety of sources, such as sensors, transducers, and other instruments. Digitizers typically consist of analog-to-digital converters (ADCs), which convert analog signals into digital data that can be analyzed and processed by a computer or other device.

9.3 What is the difference between a digitizer and an oscilloscope?

Both digitizers and oscilloscopes are used to capture and analyze electronic signals, but there are some key differences between the two. Oscilloscopes are typically used to display and analyze signals in real-time, while digitizers are designed for high-speed data acquisition and can capture and store signals for later analysis. Additionally, digitizers often have more channels and higher bandwidths than oscilloscopes, and are used in a wider range of applications.

9.4 What are the different types of digitizers?

There are several types of digitizers available, each with its own set of features and capabilities. Some of the most common types include benchtop digitizers, PXI modular digitizers, and USB digitizers. Benchtop digitizers are standalone units that are designed for use in a laboratory or other fixed location. Modular digitizers are designed to be integrated into larger systems, and are often used in industrial or scientific applications. USB digitizers are small, portable units that can be used with a laptop or other computer.

9.5 What are some of the key specifications to consider when selecting a digitizer?

When selecting a digitizer, there are several key specifications to consider, including sampling rate, bandwidth, resolution, dynamic range, and input impedance. Sampling rate refers to the number of samples per second that the digitizer can acquire, while bandwidth refers to the range of frequencies that the digitizer can capture. Resolution refers to the number of bits used to represent each sample, while dynamic range refers to the range of amplitudes that the digitizer can accurately capture. Input impedance refers to the electrical resistance of the digitizer's input circuitry, and can affect the accuracy of the measurements.

9.6 How do I calibrate my digitizer?

Calibration is an important step in ensuring the accuracy of your digitizer. Most digitizers come with a built-in calibration routine that can be used to verify and adjust the unit's performance. The calibration process typically involves connecting the digitizer to a known signal source and measuring the response. The results of the calibration can then be used to adjust the digitizer's settings or to apply calibration factors to the acquired data.

9.7 How can I improve the performance of my digitizer?

There are several steps that can be taken to improve the performance of your digitizer, including selecting the appropriate settings for your application, using high-quality signal cables and connectors, and avoiding sources of noise and interference. Additionally, performing regular calibration and maintenance on your digitizer can help to ensure that it is operating at peak performance.

9.8 What are some common applications for digitizers?

Digitizers are used in a wide range of applications, including scientific research, engineering, telecommunications, and medical diagnostics. Some common uses of digitizers include signal analysis, data acquisition, and waveform generation. Digitizers are also commonly used in fields such as aerospace, automotive, and consumer electronics, where they are used to test and evaluate new products and technologies.

10 About JYTEK

10.1 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 is a joint venture between Adlink Technologies and a group of experienced professionals form the industry. JYTEK independenly develop the software and hardware products and is entirely focused on the Chinese market. Our Shanghai headquarters and production service center have regular stocks to ensure timely supply; we have R&D centers in Xi'an and Chongqing to develop new products; we also have highly trained direct technical sales representatives in Shanghai, Beijing, Tianjin, Xi'an, Chengdu, Nanjing, Wuhan, Haerbin, and Changchun. We also have many patners who provide system level support in various cities.

10.2 JYTEK Hardware Products

According to JYTEK's agreement with our equity paNEGer Adlink Technologies, JYTEK's hardware is manufactured by the state-of-art manufacturing facility located in Shanghai Zhangjiang Hi-Tech Park. Adlink has over 20 years of the world-class low-volumn and high-mix manufacturing expertise with ISO9001-2008, China 3C, UL, ROHS, TL9000, ISO-14001, ISO-13485 certifications. Its 30,000 square meters facilities and three high-speed Panasonic SMT production lines can produce 60,000 pieces boards/month; it also has full supply chain management - planning, sweeping, purchasing, warehousing and distribution. Adlink's manufacturing excellence ensures JYTEK's hardware has word-class manufacturing quality.

One core technical advantage is JYTEK's pursue for the basic and fundamental technology excellence. JYTEK China has developed a unique PCIe, PXIe, USB hardware driver architecture, FirmDrive, upon which many our future hardware will be based.

In addition to our own developed hardware, JYTEK also rebrands Adlink's PXI product lines. In addition, JYTEK has other rebranding agreements to increase our hardware coverage. It is our goal to provide the complete product coverage in PXI and PCI modular instrumentation and data acquisition.

10.3 JYTEK Software Platform

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.

10.4 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.

11 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 explaination for PCIe/PXIe-9818 of temperature sensor data acquisition cards. The manual is copyrighted by JYTEK.

No warranty is given as to any implied warranties, express or implied, including any purpose or non-infringement of intellectual property rights, unless such disclaimer is legally invalid. JYTEK is not responsible for any incidental or consequential damages related to performance or use of this manual. The information contained in this manual is subject to change without notice.

While we try to keep this manual up to date, there are factors beyond our control that may affect the accuracy of the manual. Please check the latest manual and product information from our website.

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