ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *National Instruments USB-6501* at our website: ***Click HERE***

Technical Sales

(866) 531-6285
orders@ni.com

Last Revised: 2014-11-06 07:14:35.0

NI USB-6501

Low-Cost USB Digital I/O Device



- Small, portable digital I/O device
- 24 digital I/O lines, one 32-bit counter
- Overvoltage protection, 8.5 mA current drive
- Full-speed USB (12 Mbit/s) bus interface
- Built-in screw terminals with removable connectors for easier connectivity
- OEM version available with 34-pin IDC mass termination connectivity

Overview

The NI USB-6501 is a portable digital I/O device that provides reliable data acquisition and control at a low price. With plug-and-play USB connectivity, the USB-6501 is simple enough for home/academic applications but robust and versatile enough for laboratory/industrial applications. The board-only version is ideal for embedded OEM applications.

Back to Top

Requirements and Compatibility

OS Information

- Linux®
- Mac OS X
- Windows 2000/XP
- Windows 7
- Windows Vista x64/x86

Driver Information

- NI-DAQmx

Software Compatibility

- ANSI C
- LabVIEW
- LabWindows/CVI
- Measurement Studio
- Visual Basic
- Visual Studio
- Visual Studio .NET

Back to Top

Comparison Tables

Product	Bus	Digital I/O Lines	Counters	Current Drive	Logic Level	Industrial Feature Set
NI 6501	USB	24	1	8.5 mA	5 V TTL/CMOS	No

Back to Top

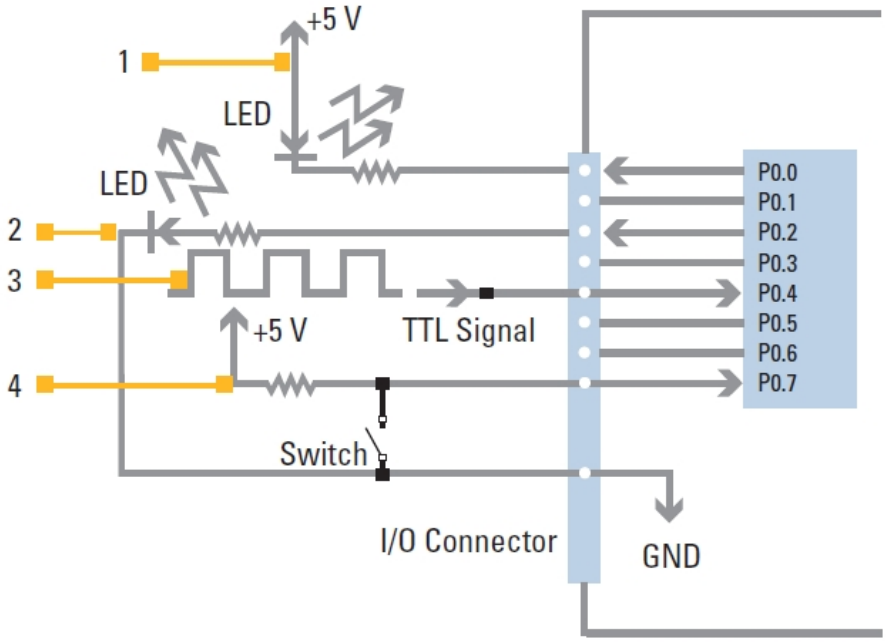
Application and Technology

Hardware

The USB-6501 is a full-speed USB device that provides 24 DIO lines and a 32-bit counter. The 24 digital lines are arranged in three ports: P0.<0..7>, P1.<0..7>, and P2.<0..7>. P2.7 can also function as a 32-bit counter. You can individually program each of the USB-6501 DIO lines as a DI or DO line and use the DIO lines to monitor or control digital signals. All samples of the DI lines and updates of the DO lines are software-timed. The default configuration of the USB-6501 DIO ports is open-drain for 5 V operation with an

onboard 4.7 kΩ pull-up resistor. You can add an external, user-provided, pull-up resistor to increase the source current drive up to 8.5 mA per line. Each DIO signal is protected against overvoltage, undervoltage, and overcurrent conditions as well as ESD events. At system startup and reset, the hardware sets all DIO lines to high-impedance inputs.

The data acquisition device does not drive the signal high or low. Each line has a weak pull-up resistor connected to it. You can configure P2.7 as the source for a 32-bit counter. In this mode, the device counts high to low transitions (falling edges) on P2.7. You can arm and disarm the counter and read or reset the counter through software. The USB-6501 supplies a nominal 5 V from two pins, one on each screw-terminal block. You can use the voltage source, which is provided by the USB host, to power external components. The USB-6501 features current-limiting short-circuit protection for safe USB host power use.



1. P0.0 configured as an open-drain digital output driving an LED
2. P0.2 configured as a push-pull digital output driving an LED
3. P0.4 configured as a digital input receiving a TTL signal from a gated inverter
4. P0.7 configured as a digital input receiving a 0 V or 5 V signal from a switch

Figure 1. Example of Connecting a Load

Software

The USB-6501 is shipped with NI-DAQmx measurement services software, a high-performance multithreaded driver for interactive configuration and data acquisition. Use it to develop customized data acquisition applications with NI LabVIEW or C-based development environments. Examples include an interactive control panel to help you get started with your application quickly.

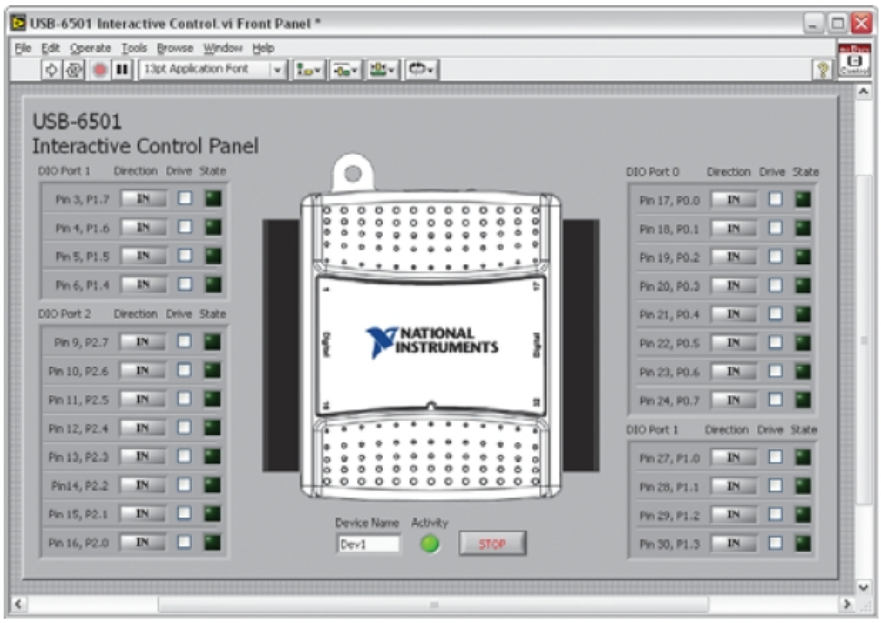


Figure 2. Interactive Control Panel Example Program Shipped with the USB-6501

Recommended Accessories

The USB-6501 has built-in screw terminals for connectivity; no additional accessories are required.

Board-Only Version for OEMs

A board-only version of the USB-6501 (part number 192317-50) is available to OEMs for use in embedded applications. The OEM version offers a 34-pin IDC ribbon cable header for mass termination instead of screw-terminal connectivity. You can mount the OEM version using standoffs (not included in kit) with your own enclosure. For information on special configurations and pricing, visit **ni.com/oem**.

Back to Top

Ordering Information

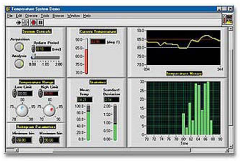
For a complete list of accessories, visit the product page on ni.com.

Products	Part Number	Recommended Accessories	Part Number
NI USB-6501			
NI USB-6501	779205-01	No accessories required.	

Back to Top

Software Recommendations

LabVIEW Professional Development System for Windows



- Advanced software tools for large project development
- Automatic code generation using DAQ Assistant and Instrument I/O Assistant
- Tight integration with a wide range of hardware
- Advanced measurement analysis and digital signal processing
- Open connectivity with DLLs, ActiveX, and .NET objects
- Capability to build DLLs, executables, and MSI installers

NI LabWindows™/CVI for Windows



- Real-time advanced 2D graphs and charts
- Complete hardware compatibility with IVI, VISA, DAQ, GPIB, and serial
- Analysis tools for array manipulation, signal processing statistics, and curve fitting
- Simplified cross-platform communication with network variables
- Measurement Studio .NET tools (included in LabWindows/CVI Full only)
- The mark LabWindows is used under a license from Microsoft Corporation.

Back to Top

Support and Services

System Assurance Programs

NI system assurance programs are designed to make it even easier for you to own an NI system. These programs include configuration and deployment services for your NI PXI, CompactRIO, or Compact FieldPoint system. The NI Basic System Assurance Program provides a simple integration test and ensures that your system is delivered completely assembled in one box. When you configure your system with the NI Standard System Assurance Program, you can select from available NI system driver sets and application development environments to create customized, reorderable software configurations. Your system arrives fully assembled and tested in one box with your software preinstalled. When you order your system with the standard program, you also receive system-specific documentation including a bill of materials, an integration test report, a recommended maintenance plan, and frequently asked question documents. Finally, the standard program reduces the total cost of owning an NI system by providing three years of warranty coverage and calibration service. Use the online product advisors at ni.com/advisor to find a system assurance program to meet your needs.

Calibration

NI measurement hardware is calibrated to ensure measurement accuracy and verify that the device meets its published specifications. To ensure the ongoing accuracy of your measurement hardware, NI offers basic or detailed recalibration service that provides ongoing ISO 9001 audit compliance and confidence in your measurements. To learn more about NI calibration services or to locate a qualified service center near you, contact your local sales office or visit ni.com/calibration.

Technical Support

Get answers to your technical questions using the following National Instruments resources.

- **Support** - Visit ni.com/support to access the NI KnowledgeBase, example programs, and tutorials or to contact our applications engineers who are located in NI sales offices around the world and speak the local language.
- **Discussion Forums** - Visit forums.ni.com for a diverse set of discussion boards on topics you care about.
- **Online Community** - Visit community.ni.com to find, contribute, or collaborate on customer-contributed technical content with users like you.

Repair

While you may never need your hardware repaired, NI understands that unexpected events may lead to necessary repairs. NI offers repair services performed by highly trained technicians who quickly return your device with the guarantee that it will perform to factory specifications. For more information, visit ni.com/repair.

Training and Certifications

The NI training and certification program delivers the fastest, most certain route to increased proficiency and productivity using NI software and hardware. Training builds the skills to more efficiently develop robust, maintainable applications, while certification validates your knowledge and ability.

- **Classroom training in cities worldwide** - the most comprehensive hands-on training taught by engineers.
-

On-site training at your facility - an excellent option to train multiple employees at the same time.

- **Online instructor-led training** - lower-cost, remote training if classroom or on-site courses are not possible.
- **Course kits** - lowest-cost, self-paced training that you can use as reference guides.
- **Training memberships** and training credits - to buy now and schedule training later.

Visit ni.com/training for more information.

Extended Warranty

NI offers options for extending the standard product warranty to meet the life-cycle requirements of your project. In addition, because NI understands that your requirements may change, the extended warranty is flexible in length and easily renewed. For more information, visit ni.com/warranty.

OEM

NI offers design-in consulting and product integration assistance if you need NI products for OEM applications. For information about special pricing and services for OEM customers, visit ni.com/oem.

Alliance

Our Professional Services Team is comprised of NI applications engineers, NI Consulting Services, and a worldwide National Instruments Alliance Partner program of more than 700 independent consultants and integrators. Services range from start-up assistance to turnkey system integration. Visit ni.com/alliance.

Back to Top

Detailed Specifications

The following specifications are typical at 25 °C, unless otherwise noted. All voltages are relative to COM unless otherwise noted.

Digital I/O	
Number of lines	
P0.<0..7>	8
P1.<0..7>	8
P2.<0..7>	8
Direction control	Input or output, software-selectable
Output driver type	Active drive (push-pull) or open collector (open-drain), software selectable
Pull-up resistor	4.7 kΩ VBus (nominally 5 V)
Absolute voltage range	– 0.5 to 5.8 V with respect to GND
Power-on state	Input (high impedance)
Digital Logic Levels	
Input low voltage	–0.3 V min, 0.8 V max
Input high voltage	2.0 V min, 5.8 V max
Input leakage current	50.0 µA max
Output low voltage	
Open collector (open-drain) or active drive (push-pull)	
I_{OL} = 2 mA	0.4 V max
I_{OL} = 8.5 mA	0.8 V max
Output high voltage	
Active drive (push-pull [1])	
I_{OH} = –2 mA	2.8 V min, 3.6 V max
I_{OH} = –8.5 mA	2.0 V min, 3.5 V max
Open collector (open-drain), I_{OH} = –0.4 mA, nominal	2.0 V min, 5.0 V max
Open collector (open-drain), I_{OH} = –7.5 mA, with external pull-up resistor	2.0 V min
Counter	
Number of counters	1 (P2.7 can be configured as a counter)

Resolution	32 bits
Counter measurements	Falling edge counting
Maximum input frequency	5 MHz
Minimum high pulse width	100 ns
Minimum low pulse width	100 ns

Bus Interface

USB specification	USB 2.0 Full-Speed (12 Mb/s)

External Voltage

+5 V output	
Voltage	4.00 V min, 5.25 V max
Current	230 mA max

Power Requirements

USB	
Input voltage	4.50 to 5.25 VDC, in configured state
Active current	80 mA typical, 500 mA max
Suspend current	500 µA max, all DIO lines disconnected

Physical Characteristics

Dimensions	
Without connectors	6.35 cm × 8.51 cm × 2.31 cm (2.50 in. × 3.35 in. × 0.91 in.)
With connectors	8.18 cm × 8.51 cm × 2.31 cm (3.22 in. × 3.35 in. × 0.91 in.)
I/O connectors	USB series B receptacle, (2) 16 position (screw terminal) plug headers
Screw-terminal wiring	16 to 28 AWG copper conductor wire with 10 mm (0.39 in.) of insulation stripped from the end
Torque for screw terminals	0.22 – 0.25 N · m (2.0 – 2.2 lb · in.)
Weight	84 g (3 oz)

Safety

If you need to clean the module, wipe it with a dry towel.

Overvoltage Protection

Connect only voltages that are within these limits.

Channel-to-COM (one channel)	±30 V max, Measurement Category I
Channels-to-COM (one port, all channels)	±8.9 V max, Measurement Category I

Measurement Category I is for measurements performed on circuits not directly connected to the electrical distribution system referred to as MAINS [2] voltage. This category is for measurements of voltages from specially protected secondary circuits. Such voltage measurements include signal levels, special equipment, limited-energy parts of equipment, circuits powered by regulated low-voltage sources, and electronics.

Caution Do *not* use this module for connection to signals or for measurements within Measurement Categories II, III, or IV.

Safety Standards

This product is designed to meet the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA 61010-1

Note For UL and other safety certifications, refer to the product label or the *Online Product Certification* section.

Hazardous Locations

This device is not certified for use in hazardous locations.

Environmental

The NI USB-6501 device is intended for indoor use only.

Operating temperature (IEC 60068-2-1 and IEC 60068-2-2)	0 to 55 °C
Operating humidity (IEC 60068-2-56)	5 to 95% RH, noncondensing
Maximum altitude	2,000 m (at 25 °C ambient temperature)

Storage temperature (IEC 60068-2-1 and IEC 60068-2-2)	– 40 to 85 °C
Storage humidity (IEC 60068-2-56)	5 to 90% RH, noncondensing
Pollution Degree (IEC 60664)	2

Electromagnetic Compatibility

This product is designed to meet the requirements of the following standards of EMC for electrical equipment for measurement, control, and laboratory use:

- EN 61326 EMC requirements; Minimum Immunity
- EN 55011 Emissions; Group 1, Class A
- CE, C-Tick, ICES, and FCC Part 15 Emissions; Class A

Note For EMC compliance, operate this device with double-shielded cables.

CE Compliance

This product meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EC; Electromagnetic Compatibility Directive (EMC)

Note For the standards applied to assess the EMC of this product, refer to the *Online Product Certification* section.

Online Product Certification

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for this product, visit ni.com/certification, search by module number or product line, and click the appropriate link in the Certification column.

Environmental Management

National Instruments is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial not only to the environment but also to NI customers.

For additional environmental information, refer to the *NI and the Environment* Web page at ni.com/environment. This page contains the environmental regulations and directives with which NI complies, as well as other environmental information not included in this document.

Waste Electrical and Electronic Equipment (WEEE)

EU Customers At the end of their life cycle, all products *must* be sent to a WEEE recycling center. For more information about WEEE recycling centers and National Instruments WEEE initiatives, visit ni.com/environment/weee.htm.

电子信息产品污染控制管理办法 （中国 RoHS）

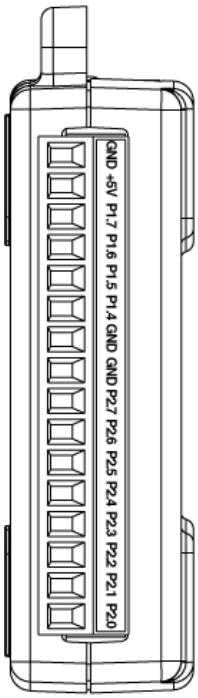
中国客户 National Instruments 符合中国电子信息产品中限制使用某些有害物质指令 (RoHS)。
关于 National Instruments 中国 RoHS 合规性信息，请登录 ni.com/environment/rohs_china。
(For information about China RoHS compliance, go to ni.com/environment/rohs_china.)

[1] The total current sourced by all DO lines simultaneously should not exceed 65 mA.

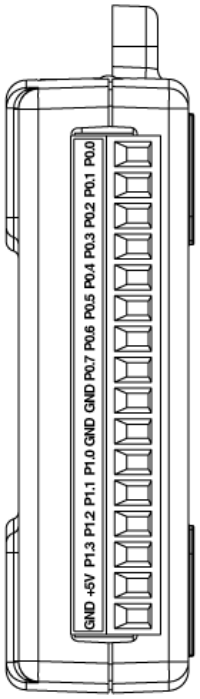
[2] MAINS is defined as the (hazardous live) electrical supply system to which equipment is designed to be connected for the purpose of powering the equipment. Suitably rated measuring circuits may be connected to the MAINS for measuring purposes.

Back to Top

Pinouts/Front Panel Connections



NI USB-6501 Digital Terminal Assignments, Left



NI USB-6501 Digital Terminal Assignments, Right

Back to Top

©2010 National Instruments. All rights reserved. CompactRIO, CVI, FieldPoint, LabVIEW, Measurement Studio, National Instruments, National Instruments Alliance Partner, NI, ni.com, NI-DAQ, and SignalExpress are trademarks of National Instruments. The mark LabWindows is used under a license from Microsoft Corporation. Windows is a registered trademark of Microsoft Corporation in the United States and other countries. Other product and company names listed are trademarks or trade names of their respective companies. A National Instruments Alliance Partner is a business entity independent from National Instruments and has no agency, partnership, or joint-venture relationship with National Instruments.

My Profile | RSS | Privacy | Legal | Contact NI © 2014 National Instruments Corporation. All rights reserved.

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP