ONTRAK
CONTROL SYSTEMS
DATA ACQUISITION AND CONTROL

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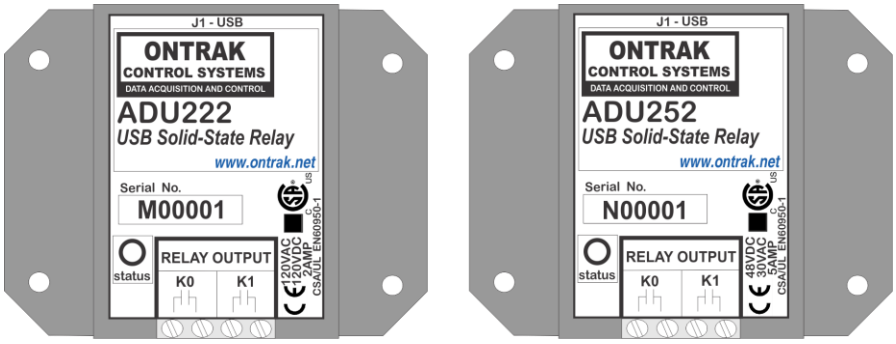
ADU222/ADU252 USB Solid-State Relay Interface User Manual

Ver 1.0



EU Declaration of Conformity

We, the undersigned,

Manufacturer:	Ontrak Control Systems Inc.
Address, City	764 Notre Dame Avenue, Unit 1, Sudbury
Province, Country, Postal Code	Ontario CANADA P3A2T2
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Email Address	tom@ontrak.net

certify and declare under our sole responsibility that the following Apparatus:

Model No: ADU222/ADU252	**SN:** M00001 and higher, N00001 and higher
Description:	**USB Solid-State Relay Interface**
Brand:	**Ontrak Control Systems Inc.**

Conforms with the essential requirements of the EMC Directive 2004/108/EC, via Annex II, based on the following specifications applied:

RF Emissions	*EN55011:2009/A1:2010 Class B*
ESD Immunity	*IEC 61000-4-2:2008 Level 2 Criterion B*
RF Immunity	*IEC 61000-4-3:2006 +A1:2007 +A2:2010 Level 2 Criterion B*
Safety	*EN60950-1 2nd Edition (CSA/UL)*

And therefore complies with the essential requirements and provisions of the EMC directive.

The technical documentation is kept at the following address:

Company:	Ontrak Control Systems Inc.
Address, City	764 Notre Dame Ave, Unit 1, Sudbury
Country, Postal Code	Canada P3A 2T2
Phone Number	(705) 671-2652
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Name of Person binding the manufacturer.	Tom Fortin
Tom Fortin- Director Ontrak Control Systems Inc	November 6, 2017 Sudbury , Ontario, CANADA

CE

Table Of Contents

1. What is Included and Where to Start

The ADU2x2 ships complete with a 10' USB cable, and this User Manual.

A complete SDK including DLL, programming language examples, and AduHidtest software is available at: http://www.ontrak.net/programming.htm

First time users should first review the ASCII command set for the ADU2x2 and then use AduHidTest USB test software to become familiar with the operation of the various features of the product.

Note: The AduHid DLL requires one of the following Windows operating systems, XP, Vista, Windows 7, Windows 8 or Windows 10. The programming section of the web site also contains examples for use with various other operating systems and provides details that allow use of the ADU2x2 without using the Windows based AduHid DLL

2. ADU2x2 Features

- Bus Powered, no external power supply required.
- 2, N. O. PhotoMOS SSR outputs rated 2.0A @ 120VAC, 2.0A @ 120VDC **(ADU222)**
- 2, N. O. PhotoMOS SSR outputs rated 5.0A @ 30VAC, 5.0A @ 48VDC **(ADU252)**
- CSA/UL Approved, CE Marked
- High Retention USB connector.
- High quality PhotoMOS relays switch AC or DC loads.
- Bi-colour LED status indicator.
- High quality cage-clamp type terminal blocks.
- Uses standard HID drivers included with Windows XP,8,10
- Mini-driver (DLL) provided for use with VB, VC, LabVIEW and TestPoint
- Programming examples and sample code included for VB, VB.NET, Visual C++
- Meets IEC61000-4-2 ESD protection for USB port.
- Available as standard flange mount or optional DIN rail mount.

CAUTION: The ADU2x2 features CSA/UL EN60950-1 2nd edition safety certification for primary insulation. For applications requiring double insulation, additional protection should be provided by user in end application.

3. The ADU2x2 STATUS LED

The ADU2x2 STATUS LED is a bi-colour (Red/Green) led indicator used to identify the current status of the ADU2x2 USB connection.

The LED modes are;

RED -ADU2x2 powered but not enumerated.
GREEN -ADU2x2 powered and enumerated by host computer.
OFF -ADU2x2 disconnected from USB bus OR host computer has entered SLEEP/SUSPEND mode.

The ADU2x2 can be connected to the USB bus via the enclosed 10' A-B USB cable. The cable provides both power and communications connections to the ADU2x2. When first connected, the STATUS led will turn RED indicating power is applied. For Windows operating systems, a message may flash on the screen indicating;

New hardware Found
ADU2x2 USB Solid-State Relay Interface

Depending on the version of Windows, the host may prompt to search for a driver. Select,

Let Windows Search for a Driver

and click next.

After several seconds, the STATUS led will turn green indicating enumeration is complete. The enumeration process is completely transparent to the application program as the ADU2x2 is a full-speed USB HID class device. Enumeration is completed by the Windows (or other) operating system standard USB HID drivers.
The ADU2x2 can be connected directly to the host hub or externally powered hubs.

Caution: (Use of System Sleep): If the operating system allows the host computer to enter sleep mode, attached USB devices will be set to suspend mode. In this mode the power draw of the ADU2x2 drops to less than 2.5mA (USB2.0 Specification). **In suspend mode the ADU2x2 relay outputs are all reset to OFF and the Status LED is turned off. Once the host computer is revived from sleep/suspend mode, the ADU2x2 status LED will turn on, however, the relay outputs will remain OFF.** Ensure system power settings are set such that the host computer does not enter sleep mode during normal operation.

Caution: If the operating system **USB Selective Suspend** is enabled, after the ADU2x2 is physically connected and enumerated (LED Green), the host may suspend the connection if no handle is opened to the ADU2x2. This will cause the LED to turn off. The LED will turn green again once a handle is opened to the ADU2x2. This is normal operation. In host applications the handle should be opened at the start of the application and remain open until the application closes, or the ADU2x2 functionality is no longer required.

4. AduHidTest USB Device Test Program

AduHidTest is a Windows based USB device test program used to test the connection of ADU data acquisition devices to a USB port. The program is also a useful tool to allow programmers to become familiar with the ADU2x2 command set. AduHidTest software can be downloaded from the Ontrak website at: http://www.ontrak.net/programming.htm . Note that the program requires the AduHid.dll to operate and it should be copied to the same directory as the AduHidTest.exe file.

There are three steps in using a USB device in any application software. The three steps are;

1. Obtain a handle for the USB device.
2. Send commands to the USB device.
3. Receive data from the USB device.

STEP 1: Obtain a handle for the ADU2x2

A handle is a unique code that application software uses to identify a USB device for the purpose of reading and writing to the device. A USB bus can have up to 128 devices connected to a single host and there are three criteria that can be used to open a handle. The three criteria are, Vendor ID, Product ID and Serial Number. If a single device is connected to the bus, any of the three criteria may be used. If multiple devices are connected, we recommend using the Serial Number to open the handle.
(All ADU devices have their unique serial number printed on the top label)

When run, the AduHidtest Software will display the following window.

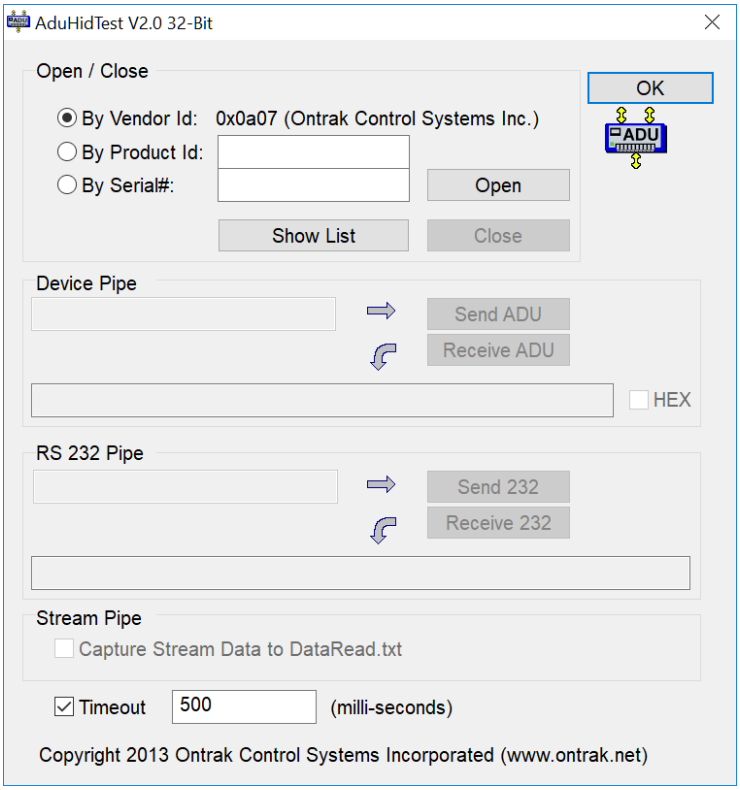

Figure 1: AduHidTest Software Window

The Open/Close section of the window is where the handle is determined. Click on the ***Show List*** button to view the devices connected to the USB bus. (Note: Only ADU devices will be listed) Figure 2 is the window that appears when the ***Show List*** Button is clicked.

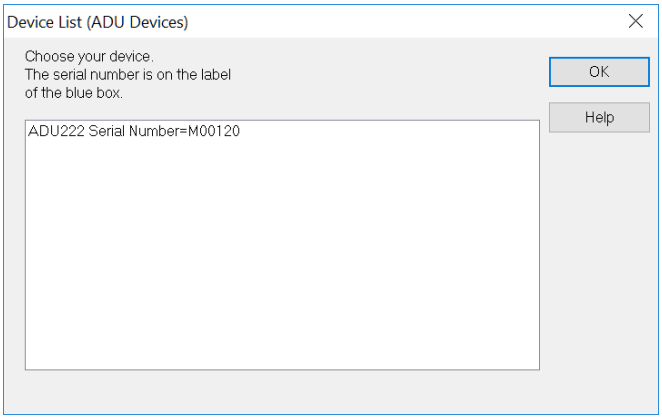

Figure 2: ***ShowList*** Window

The window indicates that there is one ADU222 connected with serial number M00120. Select the device by double clicking on the text ***" ADU222 serial number = M00120***". The AduHidTest main window will now display the product ID and Serial number. Click the ***By Serial #*** radio button and then click ***Open*** to open the handle to the selected ADU222.

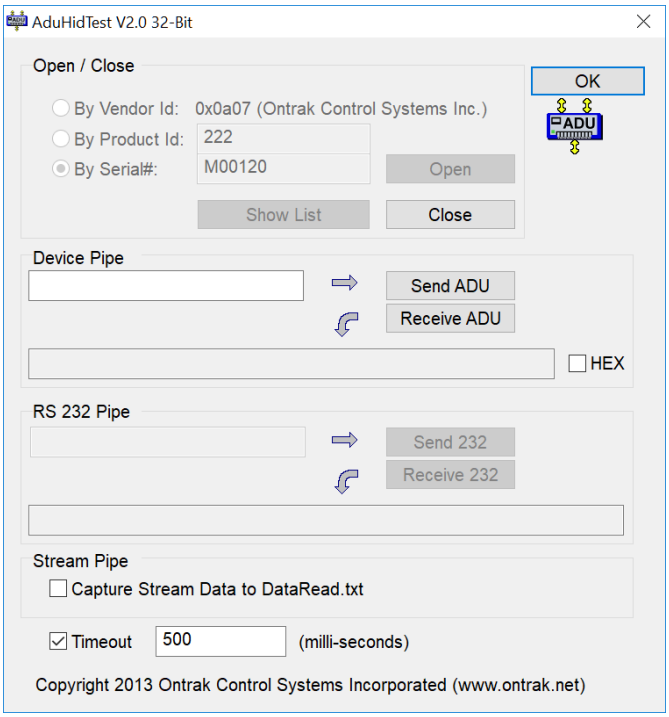

Figure 3: Handle Open to ADU222

STEP 2: Sending Commands to the ADU2x2

Once connected, you may now send commands to the available "pipes" on the ADU2x2 device. Pipes are the individual connections to functional sections of the ADU2x2. The ***Device Pipe*** is used to send standard ASCII ADU commands to control the peripherals built into the ADU2x2. The ADU2x2 does not use the ***RS232*** or ***Stream*** pipes. Type "***SK0***" (set relay K0) into the device pipe send window and click ***Send ADU***. An ***OK*** will appear beside the ***Send ADU*** button if successful and the ADU2x2 relay K0 will close. Note that ADU commands are not case sensitive.

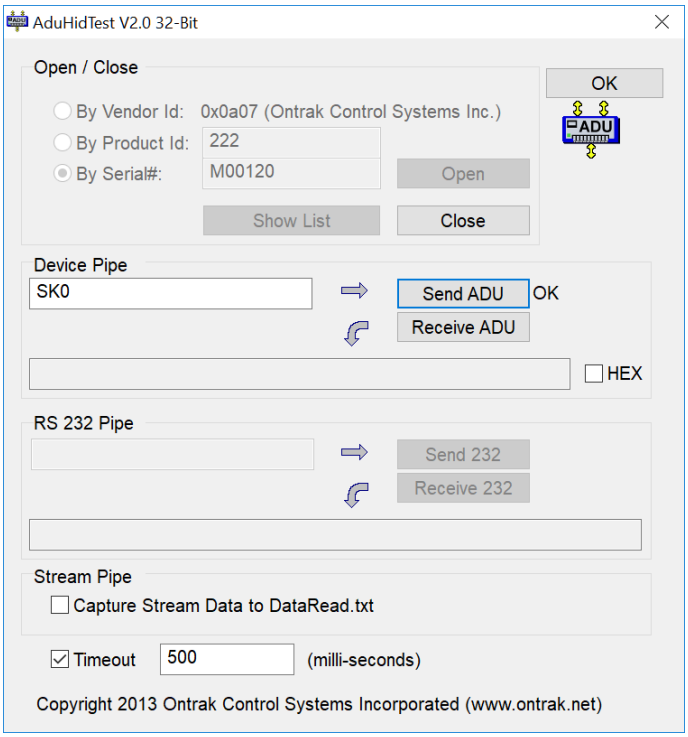

Figure 4: Sending "SK0" Command

STEP 3: Receiving Data from the ADU2x2

Some commands will cause a response to be sent from the ADU2x2 back to the host computer. For example, if an "**WD**" (read watchdog setting) command is sent, the ADU2x2 will send back the value of the watchdog setting. To read responsive commands, simply click the ***Receive ADU*** button and the data will be displayed.

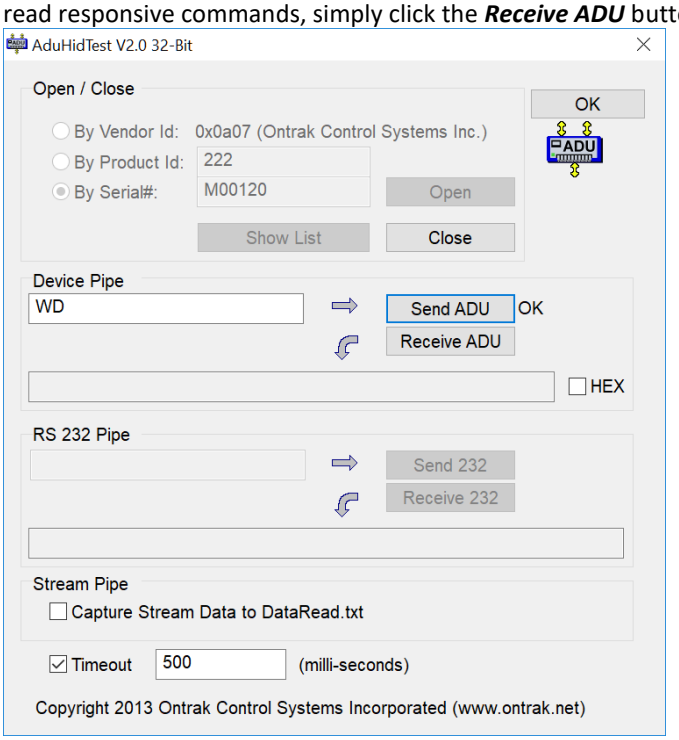

Figure 5: Sending "WD" Command

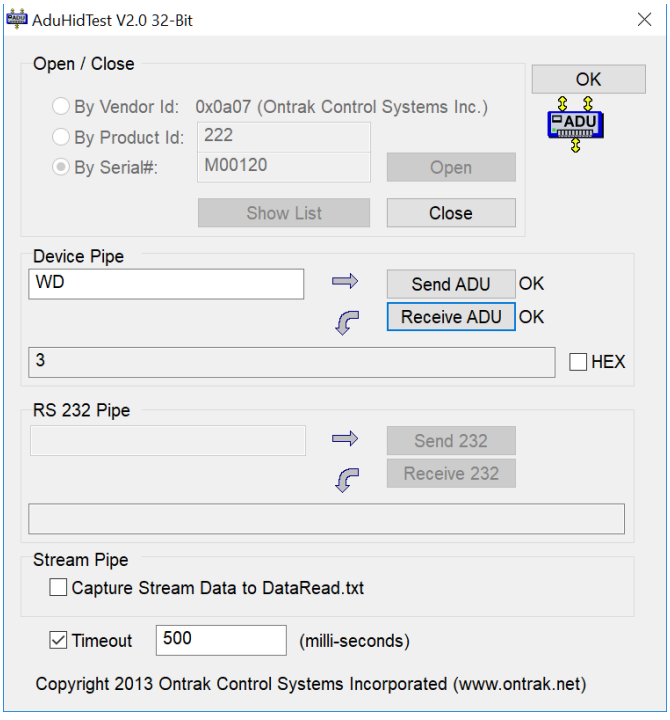

Figure 6: Receiving Data

These procedures can be repeated using the various commands available on the ADU2X2. The AduHidTest software is an invaluable tool to allow programmers to become familiar with any ADU product.

5. ADU2x2 Command Summary

Relay Commands

SKn Sets relay specified by n (n = 0 or 1)

RKn Resets relay specified by n (n = 0 or 1)

MKd Sets PORT K to decimal value d (d = 0, 1, 2 or 3)

RPKn Returns value of relay specified by n. (n = 0 or 1)

PK Returns value of PORTK in decimal format.

Watchdog Commands

WDn Sets watchdog timeout length.
(0=WD OFF, 1=1s, 2=10s, 3=1min)

WD Returns watchdog setting.

6. ADU2x2 Command Descriptions

6a) Relay Commands

The ADU2x2 features two solid-state PhotoMOS type relay outputs. They are configured as PORT K with individual assignments of K0 and K1. The relay contacts have no polarity requirements and switch either AC or DC loads.

CAUTION: Power dissipation of PhotoMOS relays increases with switching speed. At full-load rating, the maximum recommended switching speed is 1 CPS. The ADU2x2 is not recommended for PWM applications. Recommended switching speed can be safely exceeded only for applications operating at 20% or less of rated current. For example, pulsing of PLC type inputs.

SKn Sets relay specified by n (n = 0 or 1)

Ex.
SK0 -closes relay K0

RKn Resets relay specified by n (n = 0 or 1)

Ex.
RK0 -opens relay K0

MKd Sets PORT K to value d (d = 0, 1, 2 or 3)

Ex.
MK3 -sets both K0 and K1

RPKn Returns value of relay specified by n. (n = 0 or 1)

Ex.
RPK0 -returns value of relay K0
0 response (relay K0 is presently OPEN)

PK Returns value of PORTK in decimal format.

Ex.
PK
1 response (K0 is closed (SET), K1 is open (RESET)

6b) Watchdog Commands

The ADU2x2 features a host watchdog function. The host watchdog, when enabled, resets both relays, and resets the watchdog setting to 0 (WD OFF), when a watchdog timeout occurs. Following the enabling of the watchdog timer, commands must be continuously received by the ADU2x2 within the selected timer interval or a watchdog timeout will occur. After a watchdog timeout occurs, the watchdog setting must be reloaded. The host application should poll the watchdog setting to determine if a watchdog timeout has occurred. Note that the watchdog timer is reset when any command is received by the ADU2x2. This includes invalid commands.

WDn Sets watchdog timeout length.
(0=WD OFF, 1=1s, 2=10s, 3=1min)

Ex.
WD2 -sets the watchdog timeout to 10 seconds and enables watchdog timer.

WD Returns watchdog setting.

Ex.
WD
3 response (WD timeout setting is 1 minute)

Caution: (Use of System Sleep): If the operating system allows the host computer to enter sleep mode, attached USB devices will be set to suspend mode. In this mode the power draw of the ADU2x2 drops to less than 2.5mA (USB2.0 Specification). **In suspend mode the ADU2x2 relay outputs are all reset to OFF and the Status LED is turned off. Once the host computer is revived from sleep/suspend mode, the ADU2x2 status LED will turn on, however, the relay outputs will remain OFF.** Ensure system power settings are set such that the host computer does not enter sleep mode during normal operation.

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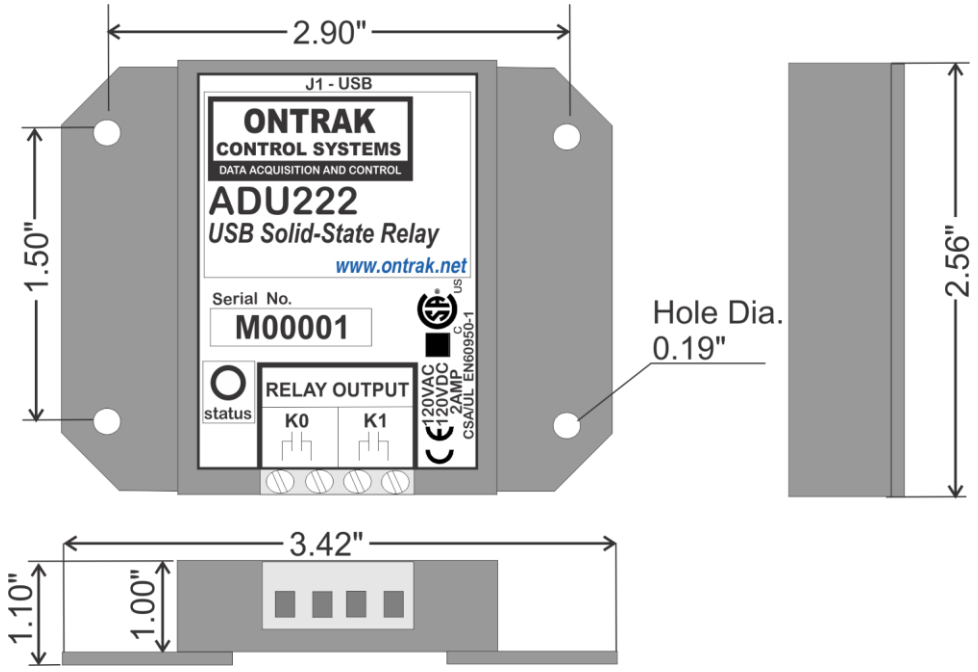
7. Specifications

Supply Voltage	NONE (Bus Powered)	
USB Supply Current (relays de-energized) USB Supply Current (relays energized)	12mA Typical 15mA Max 44mA Typical 60mA Max	
USB Connection Type	Full -Speed USB 1.1	
Operating Temperature	-25C to 85C Max	
PhotoMOS Relay Outputs		
Type	PhotoMOS – Normally Open	
Isolation Voltage	2500Vrms	
	ADU222	**ADU252**
AC Ratings	2Amps@120VAC	5Amps@30VAC
DC Ratings	2Amps@120VDC	5Amps@48VDC
On-State Resistance Typical	180mOhm	15mOhm
On-State Resistance Maximum	350mOhm	30mOhm
Maximum Operating Speed	1 CPS at full load	
Safely Approvals	CSA/UL EN60950-1 2nd Edition	
Mounting Options	Flange Mount (STANDARD) , DIN Rail	

8. Dimensions



Notes:

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