# Ultra 530.LPCIe

## User Manual | 7106e



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# Introduction

The Sealevel Ultra 530.LPCIe (Item# 7106e) is a PCI Express 2.0 Gen 1 compliant interface adapter with one field selectable RS-232/422/485/530 asynchronous serial port supporting data rates up to 921.6K bps for industrial automation and control applications.

Configure the serial port as RS-232 for standard serial COM port requirements. Choose the RS-422 mode for long distance device connections up to 4000ft. where noise immunity and high data integrity are essential. Select RS-485 and capture data from multiple peripherals in an RS-485 multi-drop network. Up to 31 RS-485 devices can be connected to each port to automate your data collection.

In RS-485 mode, the transmitter is automatically enabled in hardware, eliminating the need for application software control. This allows the 7106e to be used with standard serial communications applications and removes the risk of bus contention and data corruption. In RS-232 mode, all modem control signals are implemented for maximum compatibility with a wide range of serial peripherals. The Sealevel SeaCOM software driver and utilities make installation and operation easy in Windows 7/8.1/10 and Linux operating systems.

The Ultra 530.LPCIe ships with a Low Profile PCIe bracket that will only work in a Low Profile PCIe slot. If you need a standard size PCIe bracket, please order Item# 7106eS. The product is RoHS compliant and meets the requirements of RoHS (2011/65/EU) directive.

## Features

- Serial port configurable for RS-232/422/485/530

- On board DIP switch configuration with software override

- UART with 256-byte TX and RX FIFOs

- Asynchronous data rates to 921.6K bps

- Automatic RS-485 enable/disable

- Software selectable 250K slew rate limiting, to minimize electromagnetic interference

- The PCIe adapter includes one DB25M connector

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# Before You Get Started

## What's Included

The Ultra 530.LPCIe is shipped with the following items. If any of these items are missing or damaged, please contact Sealevel for replacement.

- **Ultra 530.LPCIe Adapter**

## Advisory Conventions

**Warning**
The highest level of importance used to stress a condition where damage could result to the product, or the user could suffer serious injury.

**Important**
The middle level of importance used to highlight information that might not seem obvious or a situation that could cause the product to fail.

**Note**
The lowest level of importance used to provide background information, additional tips, or other non-critical facts that will not affect the use of the product.

# Optional Items

Depending upon your application, you are likely to find one or more of the following items useful with the 7106e. All items can be purchased from our website (www.sealevel.com) by calling our sales team at (864) 843-4343.

| **DB25 Female to DB25 Male Extension Cable (Part Number CA104)** |
|---|
| The CA104 is a standard DB25F to DB25M serial extension cable. Extend a DB25 cable or locate a piece of hardware where it is needed with this six foot (72) cable. The connectors are pinned one-to-one, so the cable is compatible with any device or cable with DB25 connectors. The cable is fully shielded against interference and the connectors are molded to provide strain relief. Dual metal thumbscrews secure the cable connections and prevent accidental disconnection.  |

| **DB25 Female (RS-530) to DB9 Male (RS-422) Cable (Part Number CA175)** |
|---|
| DB25 Female (RS-530) to DB9 Male (RS-422) Cable, 10-inch Length. Convert any DB25 Female RS-530 Async Adapter to the Sealevel RS-422 DB9 Male pinout. Useful in situations where cabling is already in place for the Sealevel DB9 implementation of RS-422.  |

| **DB25 Female to DB37 Male Cable (Part Number CA107)** |
|---|
| DB25 Female (RS-530) to DB37 Male (RS-449 DTE) Cable, 10-inch Length. RS-530 was designed to replace the bulky DB37 RS-449 connector. The CA107 cable allows any Sealevel RS-530 adapter to be used in an RS-449 application.  |

# Terminal Block

## Terminal Block Kit - (Part Number KT104)

The TB05 terminal block breaks out a DB9 connector to 9 screw terminals to simplify field wiring of serial connections. It is ideal for RS-422 and RS-485 networks, yet it will work with any DB9 serial connection, including RS-232. The TB05 includes holes for board or panel mounting. The TB05 is designed to connect directly to Sealevel DB9 serial cards or any cable with a DB9M connector.

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# Card Setup

## Address and IRQ Selection

The 7106e is automatically assigned memory addresses and IRQs by your motherboard BIOS or by a "Plug-n-Play" Operating System. Adding or removing other hardware or moving the adapter to another slot may change the assignment of memory addresses and IRQs.

## Clock Modes and Baud Rates

The 7106e derives a 125MHz clock from the PCI express link for the Baud Rate Generator (BRG) which is divided by a clock prescaler (1 or 4) and a 16-bit clock divisor to obtain a sampling clock of 16X, 8X, or 4X the serial data rate. The BRG offers a wide range of possible baud rates. Under Windows and Linux the best choice of divisor is made automatically by the driver. The bit rate error is within the +/− 2% recommended tolerance for proper serial communication.

## Isochronous Clocking

The 7106e operates asynchronously only and does not support isochronous clocking modes.

## Electrical Interface Selection via Hardware

Serial port on the 7106e has the ability to be used as RS-232, RS-422, or RS-485. This is selectable via DIP-switch SW1 configuration. When ON, the DIP switch connects the signal to ground ('0') and when OFF, the signal is pulled high ('1'.) Please use the following examples to configure your adapter.

Mode selection via hardware (DIP switches)

| M1 Switch | M0 Switch | Mode |
|-----------|-----------|------|
| OFF | OFF | RS-232 |
| OFF | ON | RS-422 (Default) |
| ON | OFF | RS-485 with Echo |
| ON | ON | RS-485 without Echo |

## RS-485 Enable Modes

RS-485 is ideal for multi-drop or network environments. RS-485 requires a tri-state driver that will allow the electrical presence of the driver to be removed from the line. The driver is in a tri-state or high impedance condition when this occurs. Only one driver may be active at a time and the other driver(s) must be tri-stated. The output modem control signal Data Terminal Ready (DTR) is used to control the state of the driver automatically.

# Line Termination Selection via Hardware

Typically, each end of the RS-485 bus must have line-terminating resistors (RS-422 terminates at the receive end only). A 120-ohm resistor is across each RS-422/485 input in addition to a 510-ohm pull-up/pull-down combination that biases the receiver inputs. DIP switches SW1 allow the user to customize this interface to their specific requirements. Each switch position corresponds to a specific portion of the interface. If multiple 7106e adapters are configured in a RS-485 network, only the boards on each end should have switches T, PU, and PD ON.

If using the board in an RS-485 two-wire network, enable the two switches labeled 'L', which tie the positive/negative transmit/receive pairs together.

| Switch | Default | Selection if ON |
|:---:|:---:|:---:|
| T | ON | Enables RS-422/RS-485 120 ohm termination between RD+ and RD− |
| PU | ON | Enables RS-422/RS-485 RD+ 510 ohm pull-up to 5V (biasing) |
| PD | ON | Enables RS-422/RS-485 RD− 510 ohm pull-down to GND (biasing) |
| L | OFF | Enables RS-485 two-wire mode, connecting TX− to RX− |
| L | OFF | Enables RS-485 two-wire mode, connecting TX+ to RX+ |

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## Electrical Interface, Line Termination, and Echo Selection via Software

DIP switch configuration can be overridden by software settings if so desired, via Port Settings tab in Control Panel.
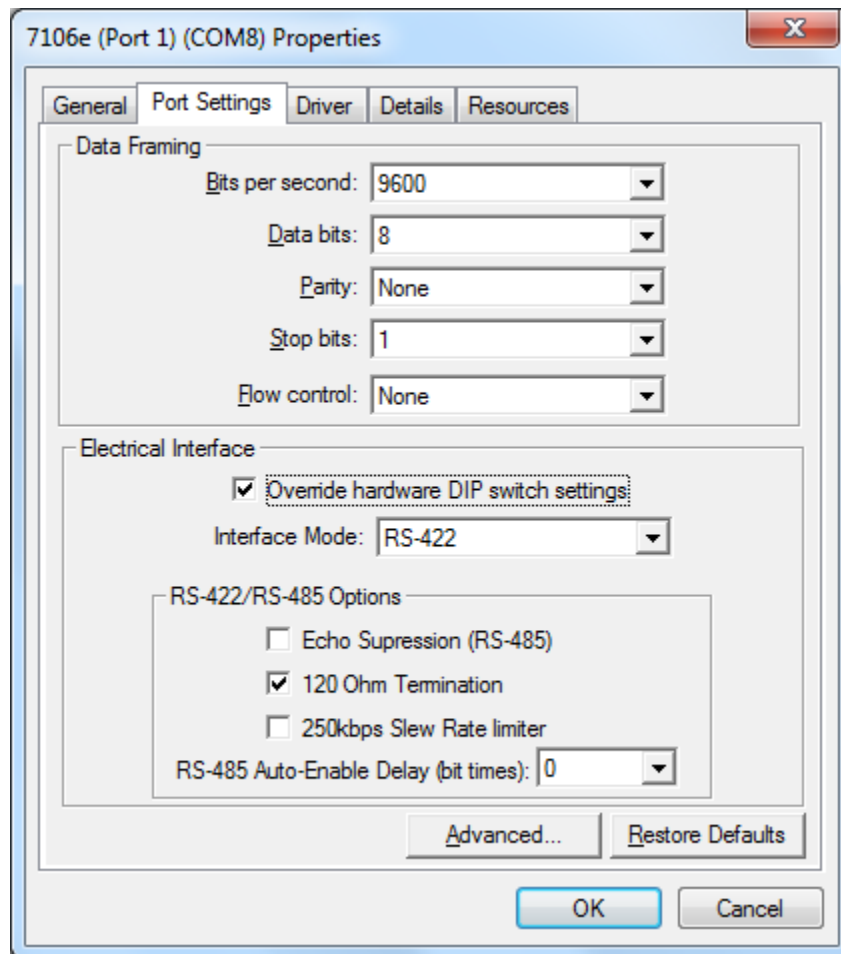


## Slew Rate Limiting

Slew Rate Limiting (250kbps) is an additional configuration setting available only via software selection. It helps minimize electromagnetic interference in applications where higher baud rates are not required.

## RS-485 Auto-Enable Delay

RS-485 Auto-Enable Delay is an additional configuration setting available only via software selection. It provides an ability to select a 0 to 15 bit-time delay after the end of the last stop-bit of the last transmitted character. This delay controls when to automatically disable the RS-485 transmitter. This delay may be useful in long-cable networks.

## On-board LED signal indicators

| Driver | D1 | D2 | D3 | D4 |
|---|---|---|---|---|
| **Loaded** | Heartbeat (1 sec on/off) | M1 | M0 | T |
| **Not Loaded** | Heartbeat | Heartbeat | Heartbeat | Heartbeat |

(a) If the driver is not loaded, all four (4) LEDs flash with the heartbeat signal and the serial port remains in tristate mode until the driver loads.

(b) If the driver is loaded, the LEDs reflect the current port mode and termination state, be it DIP switch or software controlled in accordance with the table above.

(c) M1 and M0 are lit if the value is '1' (equivalent to DIP switch OFF.)

(d) T is lit if termination is enabled (equivalent to DIP switch ON.)

# Software Installation

Do not install the Adapter in the machine until the software has been fully installed.

Only users running Windows 7 or newer should utilize these instructions for accessing and installing the appropriate driver via Sealevel's website. If you are utilizing an operating system prior to Windows 7, please contact Sealevel by calling 864.843.4343 or emailing support@sealevel.com to receive access to the proper driver download and installation instructions.

This section contains helpful information pertaining to the installation of supported Sealevel Systems, Inc. software packages. First, the process of acquiring the software is discussed. Next, the installation is detailed in a step-by-step guide for Windows and Linux operating systems.

## Where to Get Sealevel Software

The current versions of Sealevel software packages can be obtained from the Sealevel website (see following instructions). If you already have the Sealevel software, proceed to the Windows or Linux installation section.

- Sealevel software for Windows and Linux operating systems is available at these links:

  o Software for Windows

  o Software for Linux

- Choose the link for the desired software package and click on the 'Download File' link to download the current driver.
- Proceed to the Manual Software Installation guide for your operating system.

# Windows Installation

**N**  Do not connect the hardware until the software has been successfully installed.

**N**  To install Sealevel software, you must log in as an administrator or have administrator privileges in Window Guided Software Installation.  .

1.  Type the part number for your adapter in the text box and press the 'Enter' key or click on the drop box to scroll from the listing to select your product.



⚠  If you installed your hardware prior to loading/installing the software, please click on the 'Click here if you installed hardware before software' link and follow the listed instructions.

2.  Click the 'Install Drivers' button to launch the Installation Wizard.

3.  When the InstallShield Wizard' window appears, click the 'Next' button to initiate the software installation.

4.  When the 'License Agreement' window appears, accept the terms, and click 'Next' to continue. You can click the 'Print' button to print out a copy of the agreement for your records. If you do not accept the terms of the agreement, the installation will stop.

5.  When the 'Ready to Install the Program' window appears, click the 'Install' button to install the software onto the hard drive of your computer. Some versions of Windows will halt the installation and provide you with a dialog box which will ask you for permission for the installer to make changes to your computer. Click on the 'Allow' button to continue installation of your Sealevel software.

6.  If prompted, reboot your computer for changes to take effect.

## Upgrading to the current SeaCOM driver

1.  Download the current driver using the Instructions from the Where to Get Sealevel Software section above. Please take note of the destination directory for download.

2.  Uninstall the currently loaded driver SeaCOM driver found in the Control Panel.

3.  Launch the SeaCOM installer executable from the directory where it was downloaded.

4.  When the InstallShield Wizard' window appears, click the 'Next' button to initiate the software installation.

5.  When the 'License Agreement' window appears, accept the terms, and click 'Next' to continue. You can click the 'Print' button to print out a copy of the agreement for your records. If you do not accept the terms of the agreement, the installation will stop.

6.  When the 'Ready to Install the Program' window appears, click the 'Install' button to install the software onto the hard drive of your computer. Some versions of Windows will halt the installation and provide you with a dialog box which will ask you for permission for the installer to make changes to your computer. Click on the 'Allow' button to continue installation of your Sealevel software.

7.  If prompted, reboot your computer for changes to take effect.

## Linux Support

The 7106e is supported natively in Linux kernels 3.7.0-rc6 and later.

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# Hardware Installation

Do not install the PCI Express board until the software has been successfully installed

Once you have installed the software, install the 7106e into an available PCI Express slot and boot the computer. The drivers that were installed during the software installation process will automatically be used to configure the adapter.

Once the hardware installation completes, you may need to restart the computer to finalize the installation process. .

## Verifying Installation

To confirm that the serial port has been successfully installed, look in Device Manager under 'Ports (COM &LPT)' and the COM assignment will be included with the associated COM number in parentheses.

Your system will assign the next available COM number, which will vary by computer (COM8 is shown in this example).
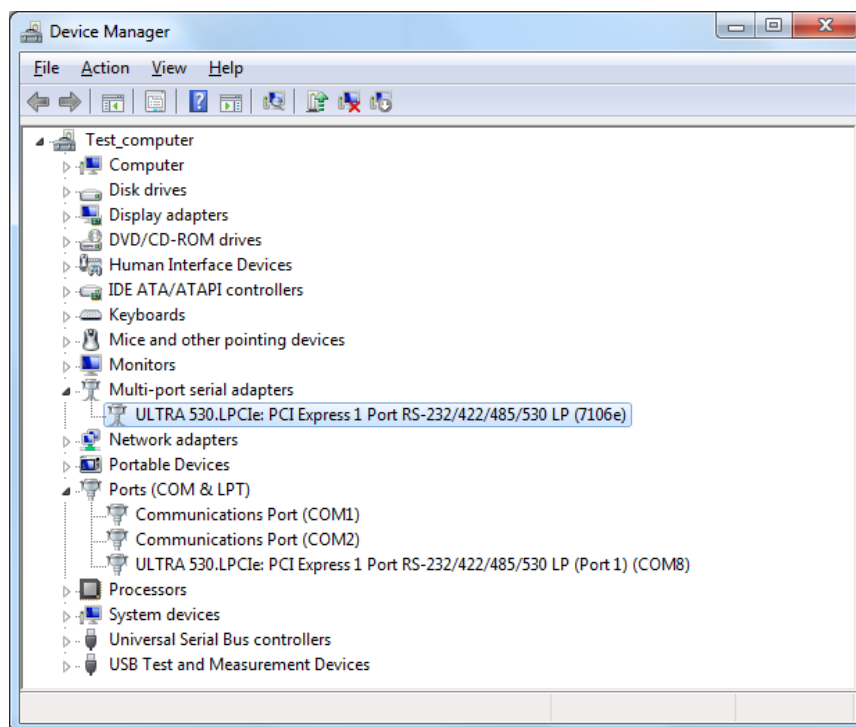
## Uninstall Instructions

The SeaCOM software program adds entries to the system registry that are necessary for specifying the operating parameters for your device. To completely remove the hardware and associated software, follow the steps in the order they appear.

⚠️  Start with the hardware installed in a PCI Express slot. Do not remove until instructed to do so.  .

## Remove Hardware Using Device Manager

To access Device Manager, follow the steps below:

1. Right click on 'My Computer' icon on your desktop or in the Start menu.

2. Click 'Manage' in the fly out menu to launch the 'Computer Management' console window.

3. In the left pane under 'System Tools', click 'Device Manager'.

4. In right pane near the bottom, expand the 'Multi-port serial adapters' section by clicking the '+' symbol.

5. Locate the ULTRA 530.LPCIe device in the listing.

6. Right click on the entry for the 'ULTRA 530.LPCIe' device and click 'Uninstall'

7. Confirm that you want to uninstall the device by clicking the 'OK' button. This will remove the hardware, COM ports and all registry entries from your computer. Keep the device installed.

8. The window will refresh and the entry for the device will no longer appear. Proceed with removing the software via Windows Control Panel.

If you want to completely remove the hardware and software from your computer, power down your computer, remove the device from the PCI Express slot, and then reboot your computer to complete the uninstallation.

# Technical Description

The Sealevel Systems 7106e provides a PCIe interface adapter with 1 asynchronous serial port providing a versatile, field selectable RS-232 interface for modems, printers, and plotters, as well as RS-422/485/530 for industrial automation and control applications.

The 7106e provides a UART with a 256 byte TX and RX FIFOs, providing programmable baud rates, data format, and interrupt control.

## DB25 Male Connector Pin Assignments

| Pin# | RS-232 | RS-422/485/530 | Pin# | RS-232 | RS-422/485/530 |
|------|--------|----------------|------|--------|----------------|
| 1 | N/C | N/C | 14 | – | TX+ (O) |
| 2 | TD (O) | TX– (O) | 15 | – | – |
| 3 | RD (I) | RX– (I) | 16 | – | RX+ (I) |
| 4 | RTS (O) | RTS– (O) | 17 | – | – |
| 5 | CTS (I) | CTS– (I) | 18 | N/C | N/C |
| 6 | DSR (I) | DSR– (I) | 19 | – | RTS+ (O) |
| 7 | GND | GND | 20 | DTR (O) | DTR– (O) |
| 8 | DCD (I) | DCD– (I) | 21 | – | RI– (I) |
| 9 | – | – | 22 | RI (I) | DSR+ (I) |
| 10 | – | DCD+ (I) | 23 | – | DTR+ (O) |
| 11 | – | – | 24 | – | – |
| 12 | – | – | 25 | – | RI+ (I) |
| 13 | – | CTS+ (I) | | | |

"N/C" = Not Connected (unused)

"–" = Reserved

(I) = Input

(O) = Output

# Technical Specifications

## Environmental Specifications

| Specification | Operating | Storage |
|---|---|---|
| Temperature Range | 0º to 70º C (32º to 122º F) | -50º to 105º C (-40º to 221º F) |
| Humidity Range | 10 to 90% R.H. Non-Condensing | 10 to 90% R.H. Non-Condensing |

## MTBF (Telcordia SR-332 prediction method)

| Mean Time Between Failure | 1,500,000 hours | At 25º C ambient |
|---|---|---|

## Manufacturing

All Sealevel Systems Printed Circuit boards are built to UL 94V0 rating and are 100% electrically tested. These printed circuit boards are solder mask over bare copper or solder mask over tin nickel.

## Power Consumption

| Typical Power Draw | 2.5W | |
|---|---|---|
| Supply voltage | +3.3 VDC | +12 VDC |
| Rating | 200 mA | 150mA |

# Appendix A – Troubleshooting

Once you have confirmed that the serial adapter COM ports are listed in Device Manager, use the Sealevel WinSSD utility to verify communications. Detailed help is included in the WinSSD utility.

Please set the adapters Electrical Interface for either RS-232 or RS-422.

If you have a loopback plug, put it on the adapter connector. If you do not have a loopback plug, you can use female jumper wires to make the connection to verify the functionality.

RS-232 requires pins 2 (Receive) & 3 (Transmit) to be jumpered as shown in this graphic:
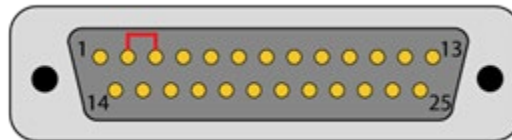


> **N** If you do not have a loopback plug or jumper wires handy, you can use a metal device such as a knife, screwdriver, key, or paperclip to short pins two and three.

RS-422 requires pins 14 & 16 (Transmit+ and Receive+) and also pins 2 & 3 (Transmit- and Receive-) to be jumpered as shown in this graphic:
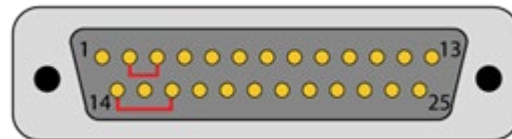
To test communications, launch the WinSSD utility in the SeaCOM folder in the 'Start' menu.

On the 'Port Information' tab, select the associated COM port and click the 'Open' button.

This will first open the COM port. From this tab the port can also be closed (See image below). Click the 'Settings' button to open the COM Port Properties dialog box. This will allow the Port Settings to be altered.
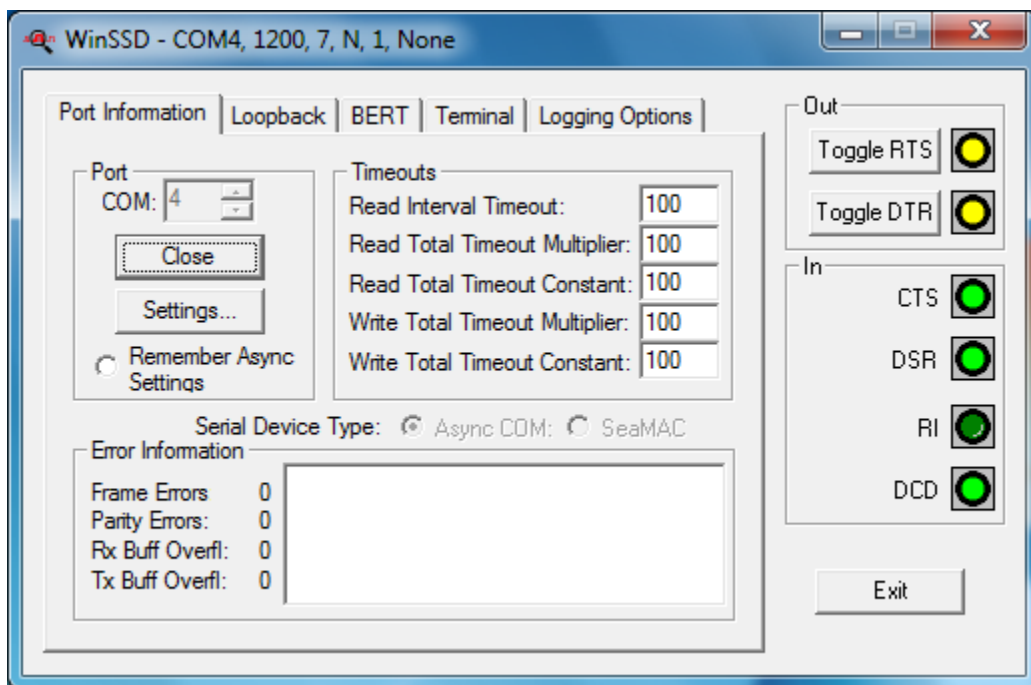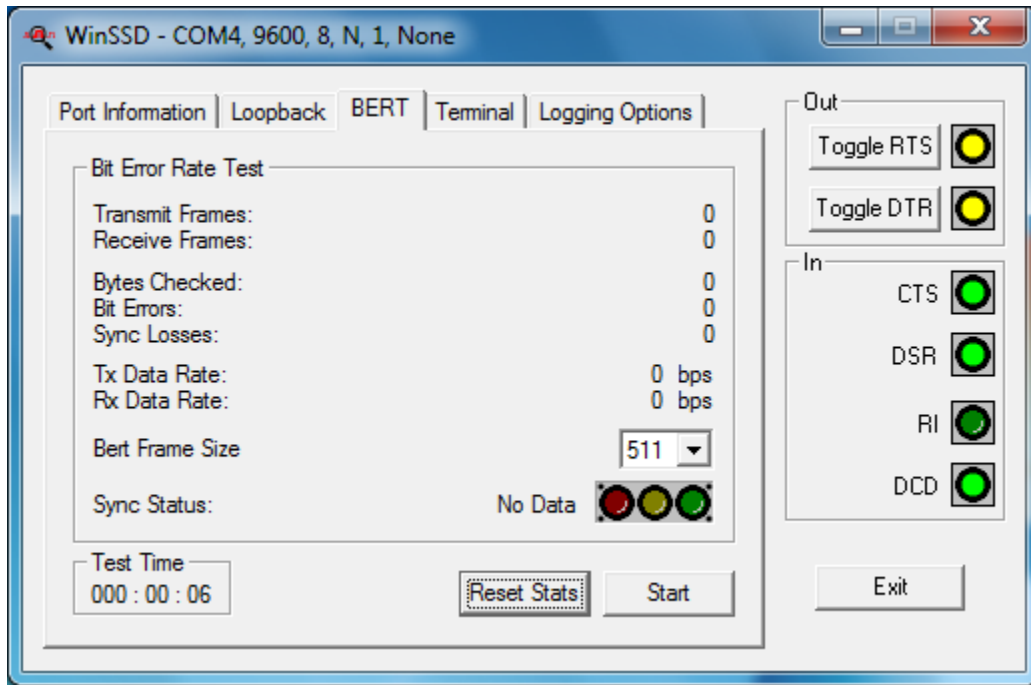
Change your parameters to 9600 bits per second, 8 data bits, no parity, 1 stop bit, and no flow control, as pictured below.
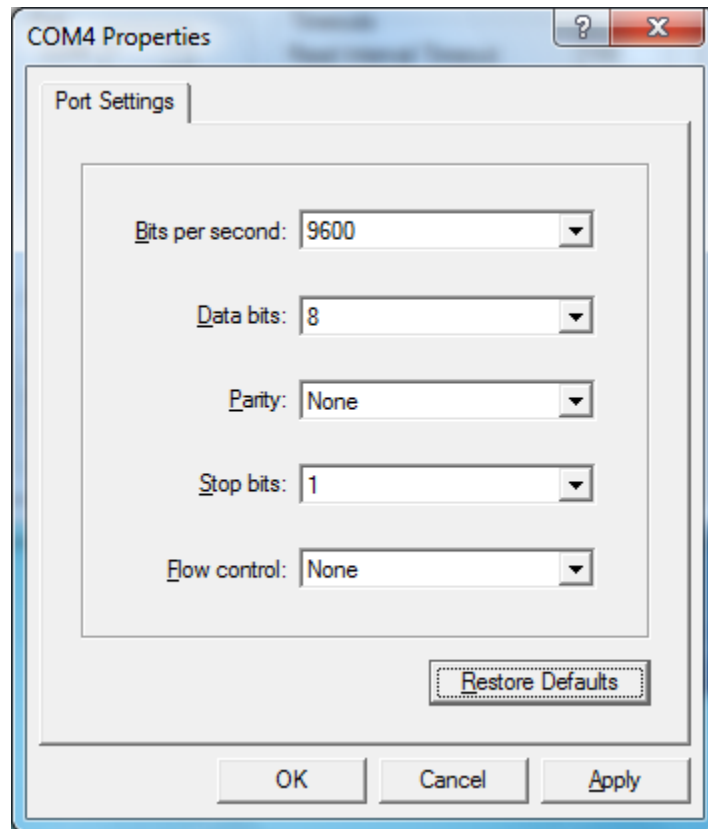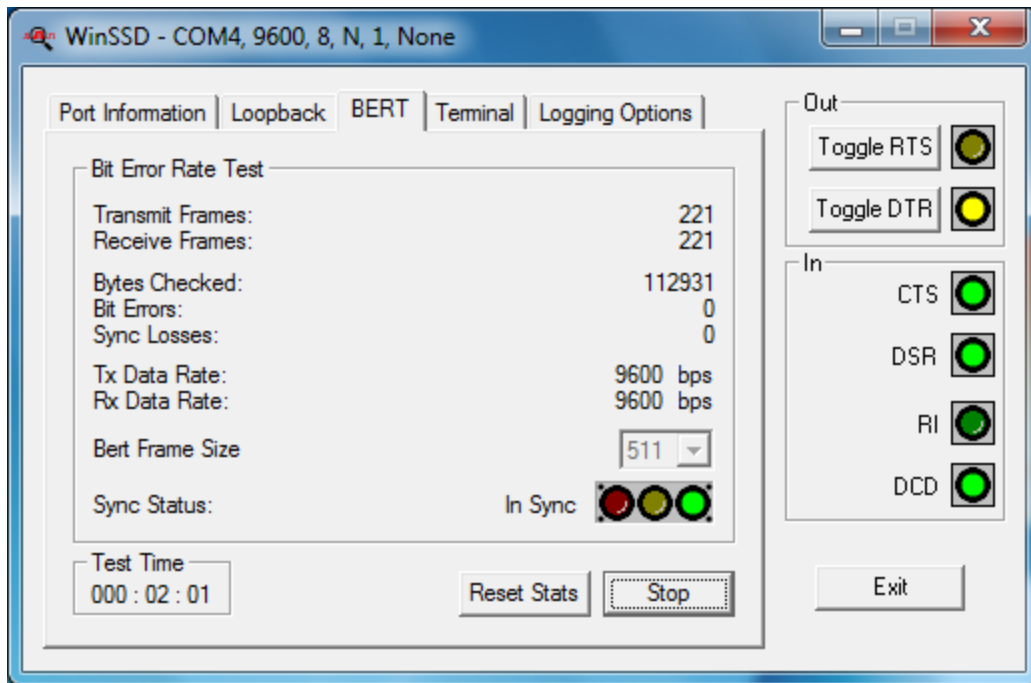


Click 'Apply' and 'OK'.

In the main WinSSD window, click on the 'BERT' tab (Bit Error Rate test).

Click on the 'Start' button.

If the COM port is properly working, the Sync Status green light will glow, and the Transmit Frames and Receive Frames will increase. The Tx and Rx Data Rates will show the calculated data rate.



This verifies that the adapter is working properly. You can continue testing this port with different configurations or proceed with testing other ports, if necessary.

If these steps do not solve your problem, please call Sealevel Systems' Technical Support, (864) 843-4343. Our technical support is free and available from 8:00 A.M.- 5:00 P.M. Eastern Time Monday through Friday. For email support contact support@sealevel.com.

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# Appendix B – Handling Instructions

## ESD Warnings

### Electrostatic Discharges (ESD)

A sudden electrostatic discharge can destroy sensitive components. Proper packaging and grounding rules must therefore be observed. Always take the following precautions:

- Transport boards and cards in electrostatically secure containers or bags.
- Keep electrostatically sensitive components in their containers until they arrive at an electrostatically protected workplace.
- Only touch electrostatically sensitive components when you are properly grounded.
- Store electrostatically sensitive components in protective packaging or on anti-static mats.

### Grounding Methods

The following measures help to avoid electrostatic damages to the device:

- Cover workstations with approved antistatic material. Always wear a wrist strap connected to a properly grounded workplace.
- Use antistatic mats, heel straps, and/or air ionizers for more protection.
- Always handle electrostatically sensitive components by their edge or by their casing.
- Avoid contact with pins, leads, or circuitry.
- Turn off power and input signals before inserting and removing connectors or connecting test equipment.
- Keep work area free of non-conductive materials such as ordinary plastic assembly aids and Styrofoam.
- Use field service tools such as cutters, screwdrivers, and vacuum cleaners that are conductive.

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# Appendix C – Electrical Interface

## RS-232

Quite possibly the most widely used communication standard is RS-232. This implementation has been defined and revised several times and is often referred to as RS-232-C/D/E or EIA/TIA-232-C/D/E. It is defined as *"Interface between Data Terminal Equipment and Data Circuit- Terminating Equipment Employing Serial Binary Data Interchange"*. The mechanical implementation of RS-232 is on a 25-pin D sub connector. The IBM PC computer defined the RS-232 port on a 9 pin D sub connector and subsequently the EIA/TIA approved this implementation as the EIA/TIA-574 standard. This standard has defined as the *"9-Position Non-Synchronous Interface between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange"*. Both implementations are in widespread use and will be referred to as RS-232 in this document. RS-232 is capable of operating at data rates up to 20K bps / 50 ft. The absolute maximum data rate may vary due to line conditions and cable lengths. RS-232 often operates at 38.4K bps over very short distances. The voltage levels defined by RS-232 range from -12 to +12 volts. RS-232 is a single ended or unbalanced interface, meaning that a single electrical signal is compared to a common signal (ground) to determine binary logic states. A voltage of +12 volts (usually +3 to +10 volts) represents a binary 0 (space) and -12 volts (-3 to -10 volts) denote a binary 1 (mark). The RS-232 and the EIA/TIA-574 specification define two types of interface circuits **D**ata **T**erminal **E**quipment (**DTE**) and **D**ata **C**ircuit-Terminating **E**quipment (**DCE**). The Sealevel Systems Adapter is a DTE interface.

## RS-422

The RS-422 specification defines the electrical characteristics of balanced voltage digital interface circuits. RS-422 is a differential interface that defines voltage levels and driver/receiver electrical specifications. On a differential interface, logic levels are defined by the difference in voltage between a pair of outputs or inputs. In contrast, a single ended interface, for example RS-232, defines the logic levels as the difference in voltage between a single signal and a common ground connection. Differential interfaces are typically more immune to noise or voltage spikes that may occur on the communication lines. Differential interfaces also have greater drive capabilities that allow for longer cable lengths. RS-422 is rated up to 10 Megabits per second and can have cabling 4000 feet long. RS-422 also defines driver and receiver electrical characteristics that will allow 1 driver and up to 32 receivers on the line at once. RS-422 signal levels range from 0 to +5 volts. RS-422 does not define a physical connector.

## RS-485

RS-485 is backwardly compatible with RS-422; however, it is optimized for party line or multi-drop applications. The output of the RS-422/485 driver is capable of being Active (enabled) or Tri-State (disabled). This capability allows multiple ports to be connected in a multi-drop bus and selectively polled. RS-485 allows cable lengths up to 4000 feet and data rates up to 10 Megabits per second. The signal levels for RS-485 are the same as those defined by RS-422. RS-485 has electrical characteristics that allow for 32 drivers and 32 receivers to be connected to one line. This interface is ideal for multi-drop or network environments. RS-485 tri-state driver (not dual-state) will allow the electrical presence of the driver to be removed from the line. Only one driver may be active at a time and the other driver(s) must be tri-stated. RS-485 can be cabled in two ways, two wire and four wire mode. Two-wire mode does not allow for full

duplex communication and requires that data be transferred in only one direction at a time. For half-duplex operation, the two transmit pins should be connected to the two receive pins (Tx+ to Rx+ and Tx- to Rx-). Four wire mode allows full duplex data transfers. RS-485 does not define a connector pin-out or a set of modem control signals. RS-485 does not define a physical connector.

## RS-530

RS-530 (a.k.a. EIA/TIA-530) compatibility means that RS-422 signal levels are met, and the pin-out for the DB-25 connector is specified. The EIA (Electronic Industry Association) created the RS-530 specification to detail the pin-out and define a full set of modem control signals that can be used for regulating flow control and line status. The RS-530 specification defines two types of interface circuits, Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE). The Sealevel Systems adapter is a DTE interface.

# Appendix D – Asynchronous Communications

Serial data communications implies that individual bits of a character are transmitted consecutively to a receiver that assembles the bits back into a character. Data rate, error checking, handshaking, and character framing (start/stop bits) are pre-defined and must correspond at both the transmitting and receiving ends.

Asynchronous communications is the standard means of serial data communication for PC compatibles and PS/2 computers. The original PC was equipped with a communication or COM: port that was designed around an 8250 Universal Asynchronous Receiver Transmitter (UART). This device allows asynchronous serial data to be transferred through a simple and straightforward programming interface. A start bit, followed by a pre-defined number of data bits (5, 6, 7, or 8) defines character boundaries for asynchronous communications. The end of the character is defined by the transmission of a pre-defined number of stop bits (usually 1, 1.5 or 2). An extra bit used for error detection is often appended before the stop bits.
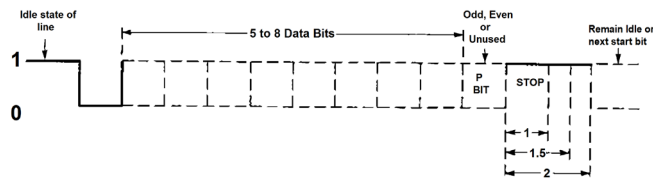


*Figure 1 - Asynchronous Communications Bit Diagram*

This special bit is called the parity bit. Parity is a simple method of determining if a data bit has been lost or corrupted during transmission. There are several methods for implementing a parity check to guard against data corruption. Common methods are called (E)ven Parity or (O)dd Parity. Sometimes parity is not used to detect errors on the data stream. This is referred to as (N)o parity. Because each bit in asynchronous communications is sent consecutively, it is easy to generalize asynchronous communications by stating that each character is wrapped (framed) by pre-defined bits to mark the beginning and end of the serial transmission of the character. The data rate and communication parameters for asynchronous communications have to be the same at both the transmitting and receiving ends. The communication parameters are baud rate, parity, number of data bits per character, and stop bits (i.e.,9600,N,8,1).

# Appendix E – Ground loop Phenomenon

## What is Ground Loop?

Ground loop Phenomenon occurs when two (or more) pieces of equipment are connected together with a common ground and a different ground potential exists at each location. This current can cause the connected equipment to experience noise that in turn causes data transmission errors. In the extreme this ground current can cause equipment malfunction or even destruction.

## Cabling Recommendations

When connecting the 7106e in a RS-485 network, care should be taken that both ends of the network are not isolated from ground (see Figure 8). This "floating" ground condition could cause the capacitive or inductive coupling of voltages that will cause a break down in the DC to DC converter circuit or in the opto-isolator circuit. This condition will cause data errors and possibly destruction of the receiver circuit.
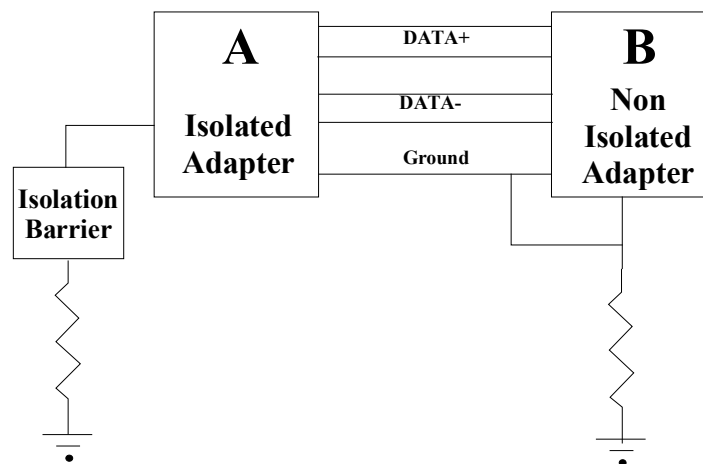
# Appendix F – Mechanical Drawing
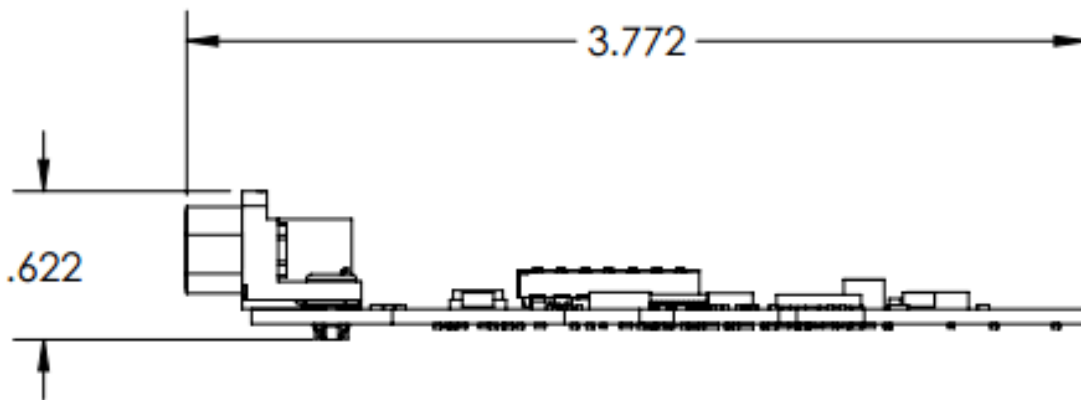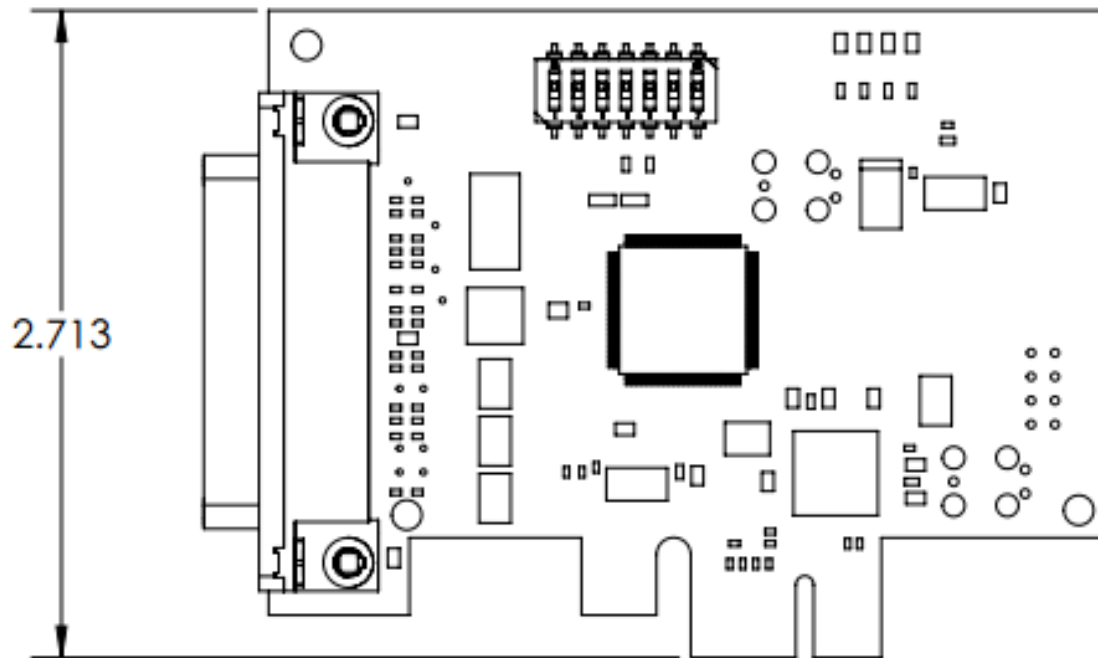
# Appendix G – Compliance Notices

## Federal Communications Commission (FCC) Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

## ISED Canada

- **CAN ICES-003(A) / NMB-003(A)**

## EMC Directive Statement

This equipment has been evaluated or tested and found in compliance with the requirements of the following directives issued by the European Commission:

- EMC Directive **2014/30/EU**
- RoHS Directive **2011/65/EU + (EU) 2015/863**

CE marking is recognized in the UK as an acceptable method of demonstrating compliance for certain categories of products, including the one described in this manual.

This is a Class A Product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures to prevent or correct the interference.

Always use the cabling provided with this product if possible. If no cable is provided or if an alternate cable is required, use high quality shielded cabling to maintain compliance with FCC/EMC directives.

# Warranty

Sealevel's commitment to providing the best I/O solutions is reflected in the Lifetime Warranty that is standard on all Sealevel manufactured I/O products. We are able to offer this warranty due to our control of manufacturing quality and the historically high reliability of our products in the field. Sealevel products are designed and manufactured at its Liberty, South Carolina facility, allowing direct control over product development, production, burn-in and testing. Sealevel achieved ISO-9001:2015 certification in 2018.

## Warranty Policy

Sealevel Systems, Inc. (hereafter "Sealevel") warrants that the Product shall conform to and perform in accordance with published technical specifications and shall be free of defects in materials and workmanship for the warranty period. In the event of failure, Sealevel will repair or replace the product at Sealevel's sole discretion. Failures resulting from misapplication or misuse of the Product, failure to adhere to any specifications or instructions, or failure resulting from neglect, abuse, accidents, or acts of nature are not covered under this warranty.

Warranty service may be obtained by delivering the Product to Sealevel and providing proof of purchase. Customer agrees to ensure the Product or assume the risk of loss or damage in transit, to prepay shipping charges to Sealevel, and to use the original shipping container or equivalent. Warranty is valid only for original purchaser and is not transferable.

This warranty applies to Sealevel manufactured Product. Product purchased through Sealevel but manufactured by a third party will retain the original manufacturer's warranty.

## Non-Warranty Repair/Retest

Products returned due to damage or misuse and Products retested with no problem found are subject to repair/retest charges. A purchase order or credit card number and authorization must be provided in order to obtain an RMA (Return Merchandise Authorization) number prior to returning Product.

## How to obtain an RMA (Return Merchandise Authorization)

If you need to return a product for warranty or non-warranty repair, you must first obtain an RMA number. Please contact Sealevel Systems, Inc. Technical Support for assistance:

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|---|---|
| Available | Monday – Friday, 8:00AM to 5:00PM EST |
| Phone | 864-843-4343 |
| Email | support@sealevel.com |

## Trademarks

Sealevel Systems, Incorporated acknowledges that all trademarks referenced in this manual are the service mark, trademark, or registered trademark of the respective company.

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