SEALEVEL®

COMM+4/232.PCIe
User Manual
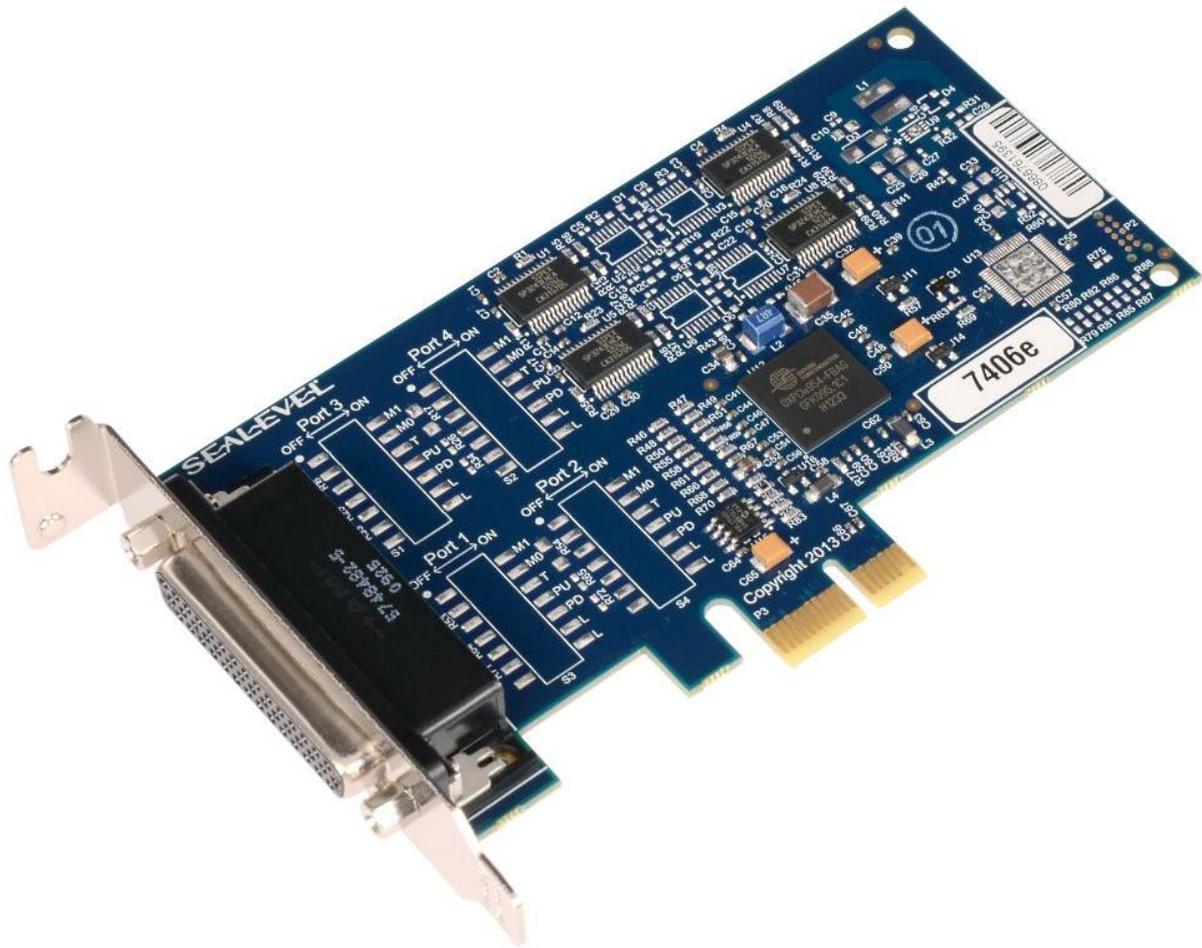
Item# 7406e and 7406eS

Contents

Introduction

The Sealevel COMM+4/232.PCIe is a four channel RS-232 PCI express Bus serial I/O adapter supporting data rates up to 921.6Kbps.

The RS-232 compatibility allows for connection to devices utilizing the RS-232 electrical interface, such as modems, data-entry terminals, and plotters.

The COMM+4/232.PCIe will operate on x1, x4, x8 or x16 PCIe Bus slots.

Features

- PCI Express four-port serial interface adapter
- High performance OXPCIe954 UART with 128-byte FIFOs
- Oscillator and clock prescaler support wide range of baud rates
- Supports 9-bit protocol framing
- Each port supports data rates to 921.6K bps
- PCI Express x1 compliant via x1 connector
- Compatible with all low profile and standard size PCI Express slots
- All modem control signals are implemented
- Includes 36" cable that terminates to four DB25M connectors (Item# CA199)
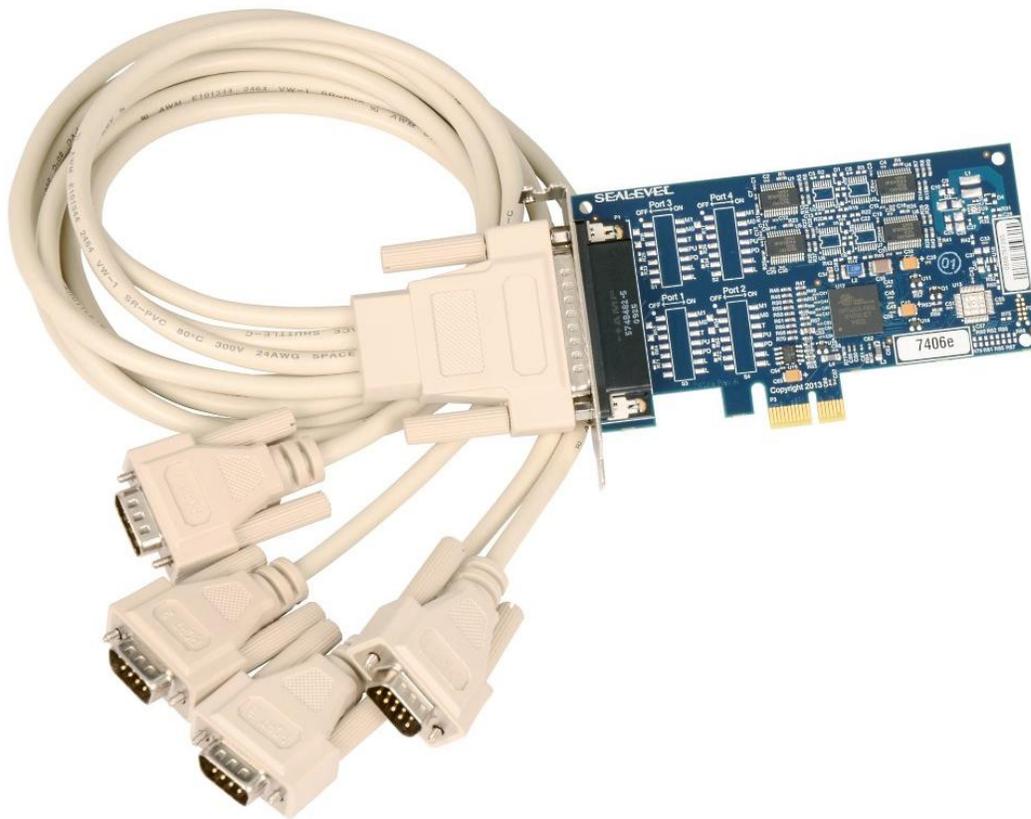
Before You Get Started

What's Included

The COMM+4/232.PCIe is shipped with the following items. If any of these items are missing or damaged, please contact Sealevel for replacement.

- COMM+4/232.PCIe Serial I/O Adapter - Four-Port RS-232 Serial Interface
    7406e – PCI Express Board with Low Profile PC Bracket
    7406eS – PCI Express Board with Standard Height PC Bracket
- CA199 - DB44 Male to (4) DB25 Male Cable
- Sealevel Software CD – SeaCOM software and user manual

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 COMM+4/232.PCIe. All items can be purchased from our website (www.sealevel.com) by calling our sales team at (864) 843-4343.

Terminal Block Kit (Item# KT104)	
Terminal Block Kit - TB04 + CA104 Cable	
DB25 Serial Cable (Item# CA104)	
DB5 Female to DB25 Male Extension Cable, 72 Inch Length	

DB25F to DB9M Adapter (Item# CA140)	
DB25 Femal to DB9 Male – RS-232 Converter	
Modular Adapter (Item# RJ25S8)	
DB25 Femal to RJ45 Modular Adpater	

Hardware Description

PCI EXPRESS BOARD

The 7406e is a low profile PCI Express 1.0a compliant board via single-lane x1 slot. It can be used in any single- or multi-lane PCI Express slot. It is available in standard height PCI Express as item# 7406eS.

DB44F BOARD CONNECTOR

The board integrates a DB44 female connector for interfacing the four serial ports via the included cable.

DB25M SERIAL CONNECTORS

The 7406e ships with a four-port cable (Item# CA199) that includes four DB25 male serial connectors. The pin out for these connectors is detailed in the following Technical Description section.
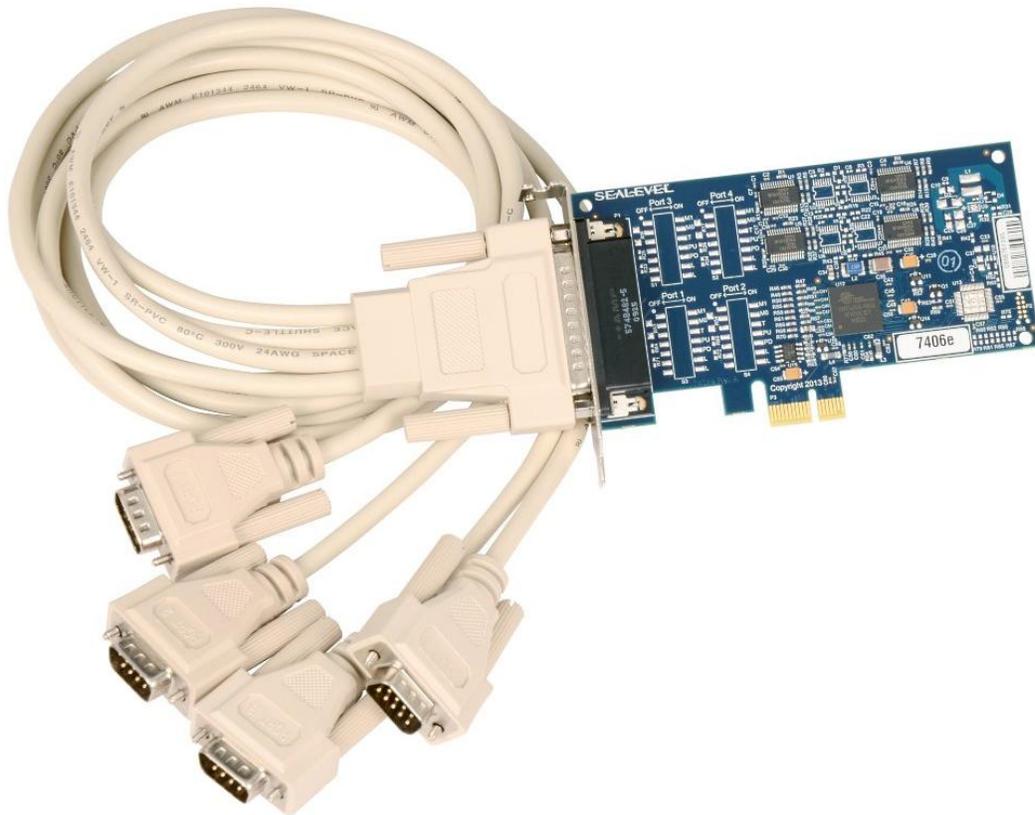
Hardware Configuration

ADDRESS AND IRQ SELECTION
The COMM+4/232.PCIe is automatically assigned I/O 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 I/O addresses and IRQs.

CLOCK MODES
The COMM+4/232.PCIe derives a 62.5MHz clock from the PCI express link which is divided by a 8 bit clock prescaler and a 16 bit clock divisor to provide a wide range of possible baud rates. Note that there are many combinations that can give the same result (e.g. Prescaler=1 and Divisor = 8, Prescaler =2 and Divisor = 4, or Prescaler=8 and Divisor = 1). As long as the calculated data rate is within +/- 2% you should communicate fine.

BAUD RATES
The following table shows some common data rates and the rates you should choose to achieve them when using the COMM+4/232.PCIe.

For This Data Rate	Clock Prescaler	Choose This Divisor DLM:DLL
1200 bps	1	3255
2400 bps	3.625	449
4800 bps	1.875	434
9600 bps	1.875	217
19.2K bps	1.375	148
38.4K bps	1.375	74
57.6K bps	22.625	3
115.2K bps	1	34
230.4K bps	1	17
460.8K bps	2.125	4
921.6K bps	2.125	2

Software Installation

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
All Sealevel products are shipped with media containing the installers for each software package available. If the media is otherwise unavailable or if desired, 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:
    - Software for Windows
    - 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 below for your operating system.

WINDOWS INSTALLATION

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

To install Sealevel software, you must log in as an administrator or have administrator privileges in Windows.

To install Sealevel software, you must log in as an administrator or have administrator privileges in Windows.

GUIDED SOFTWARE INSTALLATION

1. Insert the Sealevel media into your PC.
2. If the 'AutoRun' feature is enabled for this media the software will automatically launch.
3. Otherwise, navigate to the root directory of the media and double-click the 'autorun.exe' application to launch the installation window.
4. Select 'Install' as demonstrated in the image below.

5. 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 and press the 'Enter' key.

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.

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

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

8. 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.

9. When the 'Ready to Install the Program' window appears, click the 'Install' button to install the software onto the hard drive of your computer. The files will be automatically installed into the 'C:\Program Files' folder on 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.

10. The following dialog box may appear, as shown below. Click the 'OK' button to continue.

All Sealevel Systems software drivers have been fully tested by Sealevel. Clicking 'OK' will not harm your system.

11. The following dialog box may appear, as shown below. Click the 'OK' button to continue.

This is a notification that if you are upgrading from a previous driver version, you should remove the associated Device Manager hardware entries and reinstall the adapter after the installing the SeaCOM software.

12. The setup file will automatically detect the operating environment and install the proper components. Next follow the information presented on the screens that follow. Once the installation is complete, close the disk installation window.

13. Refer to the Physical Installation section to connect and install your adapter.

MANUAL SOFTWARE INSTALLATION

1. To install a software package from the Sealevel media; browse the Sealevel Systems media 'Software' directory. For example: Software\SeaCOM\Windows\SeaCOM Installer.exe

2. If you are using Windows Vista or newer operating systems, right click on the installer executable and choose 'Run as Administrator'. If you are using an operating system prior to Windows Vista, double click on the executable to launch the InstallShield and initiate the driver installation.

3. Please refer to step six above in the Guided Software Installation section and follow the remaining installation steps.

4.

UPGRADING TO THE CURRENT SEACOM DRIVER

1. Download the current driver using the Instructions from the Where to Get Software section above. Please take note of the destination directory it will save to.

2. Uninstall the currently loaded driver SeaCOM driver found in the Control Panel. Prior to Windows Vista SeaCOM will be populated in 'Add/Remove Programs' list. In Vista and newer OSs it will be found in the 'Programs and Features' list.

3. Navigate to the Device Manager and remove the Sealevel adapter by right clicking on the line item choosing 'Uninstall'. Depending on your product, it can be found under either 'Multiport Serial adapters' or 'Universal Serial Bus controllers'.

4. In the Device Manager under 'Action', choose 'Scan for Hardware changes'. This will prompt the installation of the adapter and associate it with the newly installed SeaCOM driver.

LINUX SUPPORT

The 7406e is supported natively in Linux kernels 2.6.28 and later.

Technical Description

The COMM+4/232.PCIe provides four RS-232 ports from a single PCIe slot.

The COMM+4/232.PCIe utilizes the OXPCIe954 type UART. This chip features programmable baud rates, data format, interrupt control and industry leading 128-byte transmit and receive FIFOs.

The UARTs are register compatible with 16C450, 16C550, 16C654 and 16C750 UARTs. The FIFO depth can be changed to match the depth of these UARTs.

RS-232 (CA-199 DB-25) Connector Pin Assignments

Signal	Name	Pin #	Mode
GND	Ground	7	
TD	Transmit Data	2	Output
RTS	Request To Send	4	Output
DTR	Data Terminal Ready	20	Output
RD	Receive Data	3	Input
CTS	Clear To Send	5	Input
DSR	Data Set Ready	6	Input
DCD	Data Carrier Detect	8	Input
RI	Ring Indicator	22	Input

Please terminate any control signals that are not going to be used. The most common way to do this is connect RTS to CTS and RI. Also, connect DCD to DTR and DSR. Terminating these pins, if not used, will help ensure you get the best performance from your adapter.

RS-232 (DB-44)

Port #	1	2	3	4
RS-232				
TD	1	5	9	13
RD	4	8	12	30
RTS	2	6	10	14
CTS	16	20	23	27
DTR	32	36	40	43
DSR	31	35	39	42
DCD	3	7	11	15
RI	33	37	41	44
GND	17	21	24	28

Specifications

ENVIRONMENTAL SPECIFICATIONS

Specification	Operating	Storage
Temperature Range	0º to 70º C (32º to 158º F)	-50º to 105º C (-58º to 221º F)
Humidity Range	10 to 90% R.H. Non-Condensing	10 to 90% R.H. Non-Condensing

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.

POWER CONSUMPTION

Supply line	+3.3VDC
Rating	100 mA

Appendix A – Troubleshooting

1. Identify all I/O adapters currently installed in your system. This includes your on-board serial ports, controller cards, sound cards etc. The I/O addresses used by these adapters, as well as the IRQ (if any) should be identified.
2. Configure your Sealevel Systems adapter so that there is no conflict with currently installed adapters. No two adapters can occupy the same I/O address.
3. Make sure the Sealevel Systems adapter is using a unique IRQ. While the Sealevel Systems adapter does allow the sharing of IRQs, many other adapters (i.e. SCSI adapters & on-board serial ports) do not. The IRQ is typically selected by the BIOS or operating system. Some BIOS setup software will allow changing the IRQ, but others do not. Another method of changing assigned resources is to try changing PCIe slots. This will typically cause the BIOS or OS to reassign the resources.
4. Make sure the Sealevel Systems adapter is securely installed in a motherboard slot.
5. When running DOS** or Windows 3.x** refer to the supplied Sealevel Software and this User Manual to verify that the Sealevel Systems adapter is configured correctly. This software contains a diagnostic program 'SSD' (D:\software\seacom\Other\DOS\DIAG, where D: = the driver letter of your CDROM drive) will verify if an adapter is configured properly. This diagnostic program is written with the user in mind and is easy to use. You can use D:\software\seacom\Other\DOS\PCI\FindPCI.exe to determine resources that have been assigned to your adapter. Make sure that if available, the 'Use Plug-n-Play" option is turned 'OFF' in your BIOS. Having this option set to 'ON' in DOS or Windows 3.x will cause erratic operations.
6. For Windows95/98/ME/NT/2000/XP/Vista/7, the diagnostic tool 'WinSSD' is installed in the SeaCOM folder on the Start Menu during the setup process. First find the ports using the Device Manager, then use 'WinSSD' to verify that the ports are functional.
7. Always use the Sealevel Systems diagnostic software when troubleshooting a problem. This will eliminate any software issues from the equation.

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.

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 wide spread 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 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 Unil Asynchronous Receiver Transmitter (UART). This device allows asynchronous serial data to be transferred through a simple and straightforward programming interface. A starting 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.
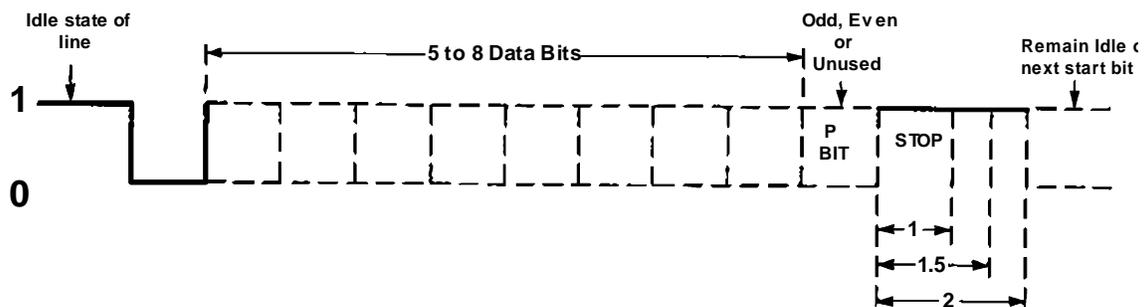

Figure 1 - Asynchronous Communications Bit Diagram

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 – Mechanical Drawing
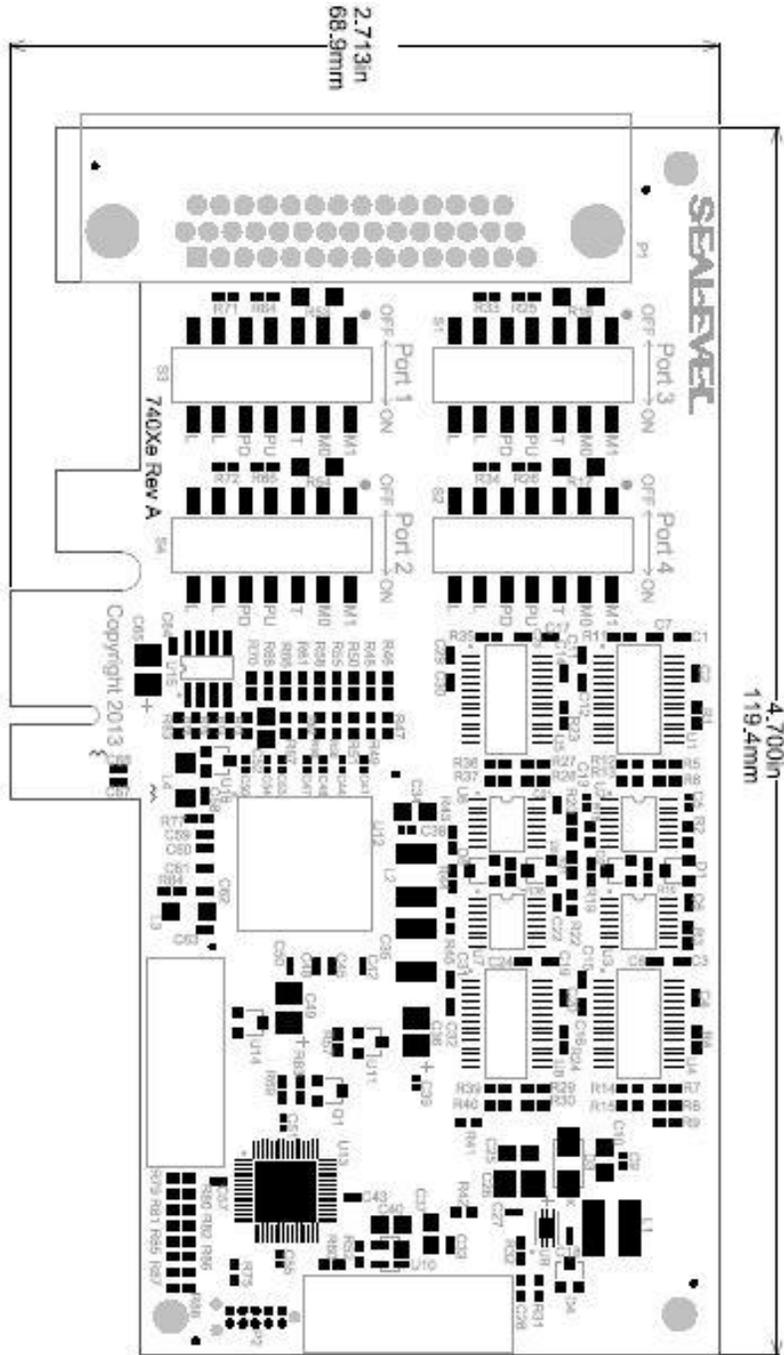
Warranty

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. Relio™ industrial computers are warranted for a period of two years and the R9 family is warranted for a five year period from date of purchase. 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-9001:2008 certification in 2011.

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 insure 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:

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

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