



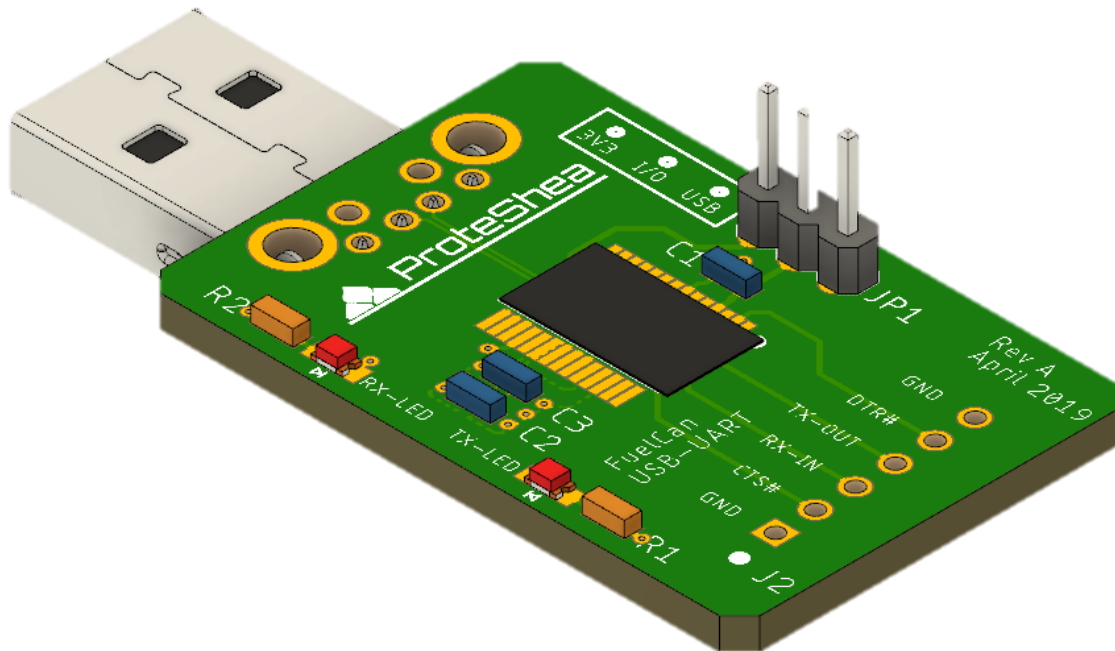
ProteShea

Learn. Apply. Create.™

FuelCan™ USB-UART

ECCN (US): EAR99

USER MANUAL



FUEL YOUR CREATIVITY ™

Use of this product or documentation signifies acceptance of the legal terms and conditions set forth below. Disagreement with any part of the legal terms and conditions set forth below permits the return of this product within 30-days of the date of purchase, per the terms described below.

Website: <https://proteshea.com>
Phone: 772-336-9761

REVISION HISTORY




| Date | Version | Revision |
|-------------|----------------|-----------------|
| 5/27/2019 | 1.0 | Initial release |
| | | |
| | | |
| | | |


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A. SYMBOL DESCRIPTION

Table 1. Symbol Description

| Symbol | Warning Description |
|--|---|
|  ELECTRIC SHOCK WARNING | Symbol draws your attention to potential serious injury or death due to electric shock |
|  WARNING | Symbol draws your attention to potential serious or minor injury |
|  ESD CAUTION | Symbol draws your attention to notification that the device is sensitive to electro-static discharge (ESD). Handle electronics on an ESD workbench and wear proper protection and clothing to prevent accidental damage or loss of functionality. |

 **WARNING:** To prevent injury, death, and/or damage to property while using this product, read this entire instruction manual.

B. IMPORTANT INSTRUCTIONS & SAFETY

WHEN USING THIS PRODUCT, BASIC PRECAUTIONS SHOULD ALWAYS BE FOLLOWED TO REDUCE THE RISK OF FIRE, ELECTRIC SHOCK, DAMAGE TO PROPERTY, AND/OR INJURY TO PERSONS, INCLUDING THE FOLLOWING:

1. Read all instructions before using the FuelCan USB-UART (or USB-UART).
2. Use the USB-UART only as described in this manual. Any other use not recommended by ProteShea may cause, without limitation, fire, electric shock, damage to property, and/or injury to persons.
3. Do not modify the USB-UART in any way that is not described in this user manual.
4. Do not use the USB-UART in a wet or extreme environment.
5. Do not operate the USB-UART after it malfunctions. Disconnect power at the main 5-pin DIN connector and unplug the AC/DC power supply from the AC source.
6. The USB-UART may contain small parts which pose a choking hazard, keep out of the reach of children less than 6 years of age.
7. When installing the USB-UART, see the **INSTALLATION** section for additional warnings and precautions.
8. For safe operation throughout the lifetime of this product, see the **MAINTENANCE** section.

C. INTENDED USES

The USB-UART is designed for use with the FuelCan™ to provide conversion from USB (i.e. from PC or laptop) to UART (i.e. RX and TX on Arduino or Raspberry Pi) and vice versa.

Its intended users, 12+ years of age, include the following:

- Electronics hobbyists
- High school students interested in a STEM degree
- College students pursuing a STEM degree
- University researchers

Its intended use cases include the following:

- Communication with host and development board (Raspberry Pi and Arduino) via UART

D. FEATURES

FuelCan USB-UART support board contains the following:

- 6-pin header with CTS, DTR, TX, and RX signals
- Compatibility with FuelCan
- Voltage I/O selection between 5Vdc and 3.3Vdc

E. TECHNICAL SPECIFICATIONS

Table 2. Overview of Technical Specification

| | |
|------------------------------|---------------------|
| Model | FuelCan USB-UART |
| Mass | 7 g |
| Dimensions | 2.1" x 1.0" x 0.52" |
| Operating Temperature | -40°C to 85°C |
| | |



WARNING: To prevent risk of fire or damage, do not exceed maximum current or power ratings of the FuelCan’s provided AC-DC adapter.

F. DESCRIPTION OF PRODUCT

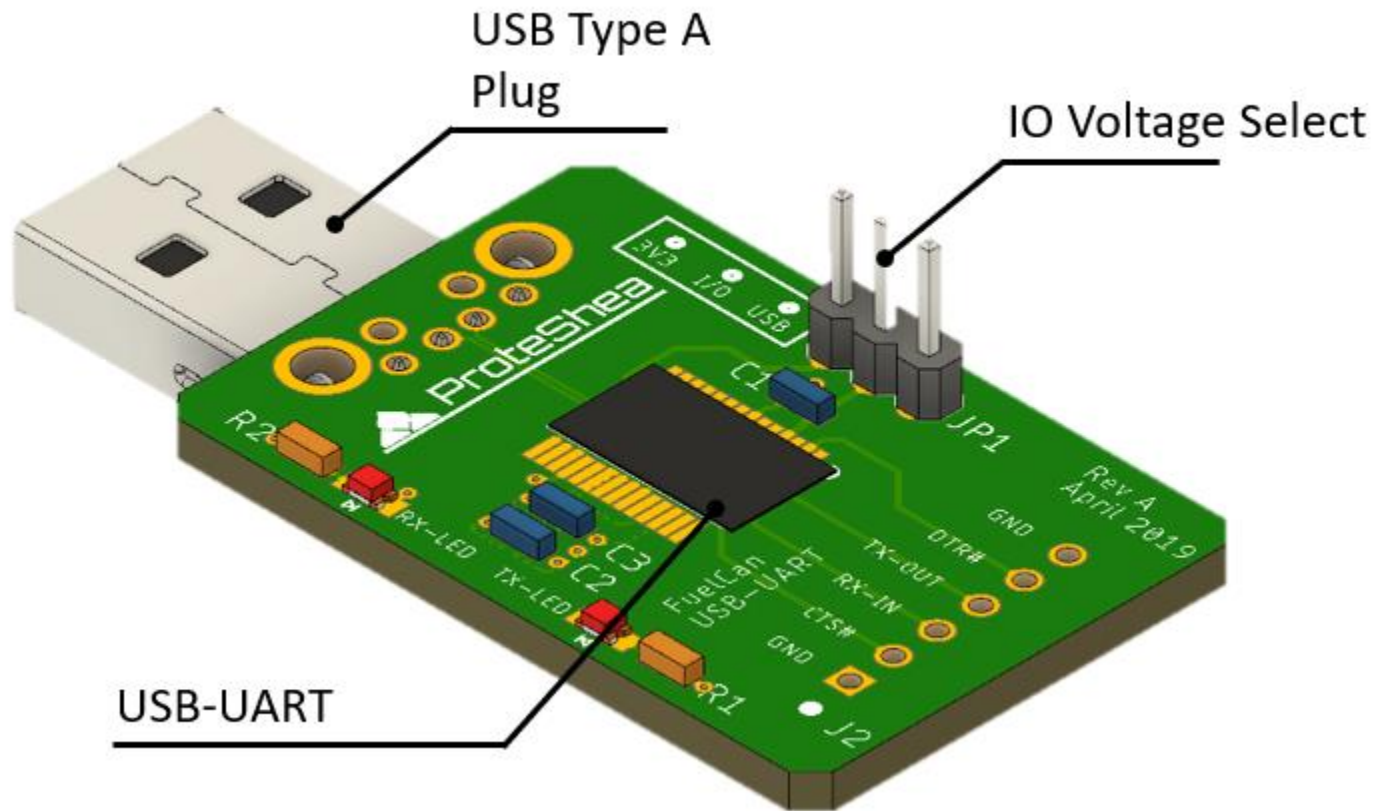


Figure 1. USB-UART Description.

G. HOW TO USE PRODUCT

To ensure correct usage of the FuelCan USB-UART board, please consult the datasheet which can be found here:

https://www.ftdichip.com/Support/Documents/DataSheets/ICs/DS_FT232R.pdf .

To select an I/O voltage of 3.3Vdc, connect the header shunt between Pins 1 and 2 on header JP1. To select an I/O voltage of 5Vdc (USB 5Vdc), connect the header shunt between Pins 2 and 3 on header JP1.

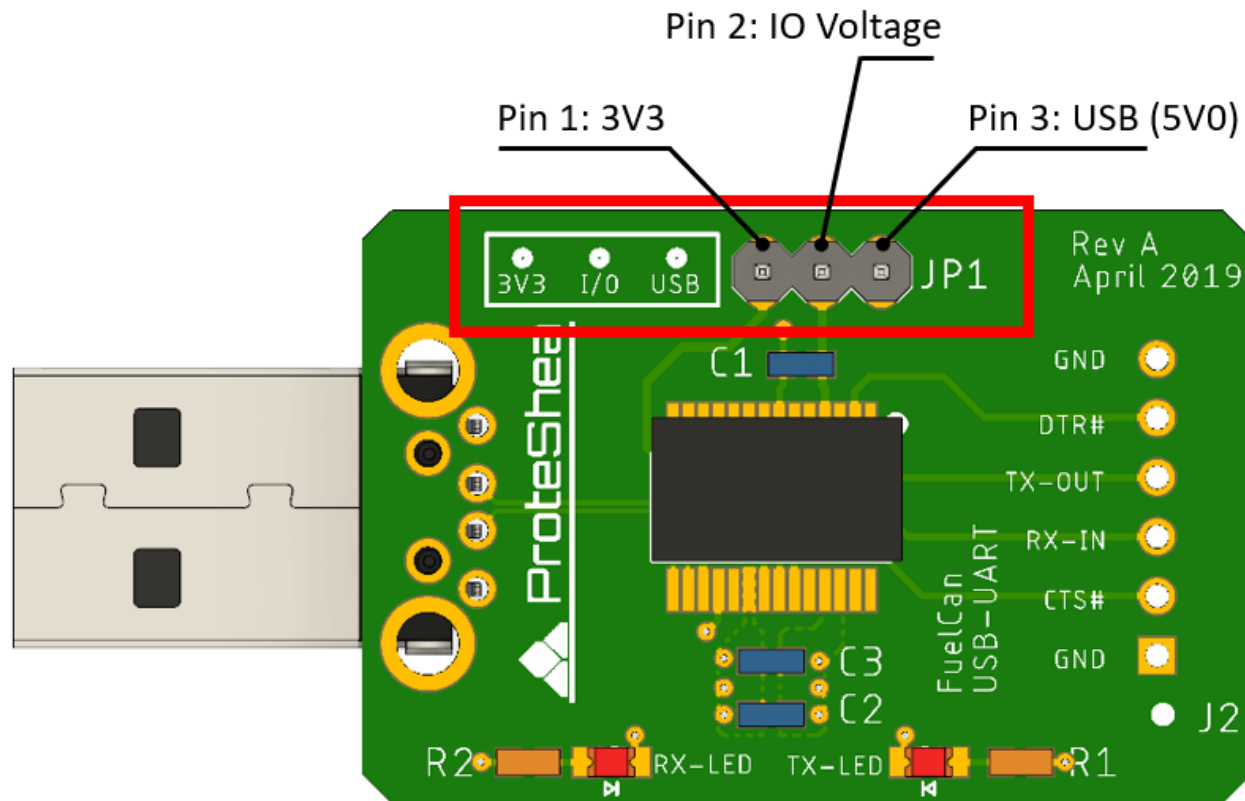


Figure 2. Selecting Desired I/O Voltage.



ELECTRIC SHOCK WARNING: Plugging in the USB-UART to the Main Interface board improperly could pose a potential risk of fire, damage, electric shock, or injury.



Figure 3. Installation of USB-UART in FuelCan™.

H. INSTALLATION

Visit us at <https://proteshea.com/support-boards/usb-uart-support-board/> to find up-to-date information and how-to videos for the USB-UART.

Follow the steps below for first-time operation of the USB-UART:



ELECTRIC SHOCK WARNING: Never use the FuelCan with a damaged AC-DC Adapter or power outlet cable. There is a potential danger of fatal electric shock.

Never plug in a USB-UART board while the FuelCan is powered. There is a potential danger of fatal electric shock.



WARNING: Do not apply excessive force when plugging in the USB-UART since this could crack the acrylic subassembly or damage the connector pins.



ESD CAUTION

1. Inspect AC-DC Adaptor and power cables to ensure there are no cuts, defects, or other damages. Do not proceed if any damage is found.
2. Inspect the acrylic subassemblies on the FuelCan to ensure there are no cracks or other damage. Do not proceed if any damage is found.
3. Use Fig. 2 to configure the desired I/O voltage (i.e. 3.3V or 5V) with the provided header shunt.
4. Use Fig. 3 to correctly orientate the USB-UART board for plugging into FuelCan.
5. Apply even pressure on both sides of the USB-UART to press into the USB1 of the FuelCan's Main Interface board. See the FuelCan user manual page 10 for details about the USB port design.

I. REMOVAL

Follow the steps below for removal of the USB-UART from the FuelCan Main Interface board:



ELECTRIC SHOCK WARNING: Never use the FuelCan with a damaged AC-DC Adaptor or power outlet cable. There is a potential danger of fatal electric shock.

Never plug in a USB-UART while the FuelCan is powered. There is a potential danger of fatal electric shock.



WARNING: Do not apply excessive force when removing the USB-UART since this could crack the acrylic subassembly or damage the connector pins.



ESD CAUTION

1. Unplug the FuelCan to power down the voltage supply to the USB-UART.
2. Apply even pressure on both sides of the USB-UART to pull the board horizontally out of the FuelCan's Main Interface board.

J. OPERATION

Follow the steps below for operation of the USB-UART:



ELECTRIC SHOCK WARNING: Never use the FuelCan with a damaged AC-DC Adapter or power cable. There is a potential danger of fatal electric shock.

Never plug in a USB-UART while the FuelCan is powered. There is a potential danger of fatal electric shock.



ESD CAUTION

1. Inspect AC-DC Adapter and power cables to ensure there are no cuts, defects, or other damages. Do not proceed if any damage is found.
2. Inspect the acrylic subassemblies on the FuelCan to ensure there are no cracks or other damage. Do not proceed if any damage is found.
3. Inspect the USB-UART board for short-circuits before plugging into Main Interface board of FuelCan.

K. MAINTENANCE

To ensure the longevity of your USB-UART, take proper precautions as listed below:

- Use two hands and apply even pressure to carefully plug-in or remove the USB-UART
- Inspect soldered wires for damage which could lead to potential short-circuits
- Store the USB-UART in a cool, dry place.
- Use only for intended purposes – see **INTENDED USES** section.

L. TROUBLESHOOTING

| Problem | Cause | Solution |
|---|--|--|
| No power to USB-UART | AC-DC adaptor shutdown voltage rails due to circuit protection | Unplug power and check for shorts between USB-UART board and connected development board |
| Driver did not automatically install when interfaced with PC or laptop. | Drivers not found | See https://www.ftdichip.com/FTDrivers.htm for driver installation files. |
| Signal integrity issues from USB-UART to development board on FuelCan | Common ground wire not present in signal wire harness | Add ground wires between USB-UART board and development board (the more the better) |
| | | |

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N. CONTACT INFORMATION

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Please send us your feedback and/or concerns by visiting <https://proteshea.com/contact/> or via email at support@proteshea.com

O. LEGAL TERMS AND CONDITIONS

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THE USB-UART IS TO BE USED ONLY FOR THE INTENDED USES SPECIFIED IN THIS MANUAL AND PROTESHEA ASSUMES NO LIABILITY FOR CHANGES OR MODIFICATIONS THAT THE CUSTOMER CHOOSES TO MAKE TO THE USB-UART. THE CUSTOMER ASSUMES FULL RESPONSIBILITY FOR ENSURING THAT ANY DESIGN INVOLVING THE USE OF THE USB-UART IS IN COMPLIANCE WITH ALL LAWS AND REGULATIONS FOR THE FREQUENCY AND POWER LEVELS OF, INCLUDING, WITHOUT LIMITATION, RADIO FREQUENCY DEVICES, WHETHER INTENTIONAL OR UNINTENTIONAL. THE CUSTOMER SHALL NOT TRANSFER, SELL, DISTRIBUTE, OR EXPORT THE USB-UART TO ANY OTHER THIRD PARTY OR COUNTRY WITHOUT THE PRIOR WRITTEN CONSENT OF PROTESHEA. THE CUSTOMER ACKNOWLEDGES THAT THE USB-UART IS CLASSIFIED AS EAR99 AND WILL COMPLY WITH THE RULES AND REGULATIONS RELATING TO UNITED STATES EXPORTS.

WARRANTY INFORMATION. ProteShea warrants that the USB-UART accompanying this document will be free from manufacturing defects for up to 30 days from the date of purchase, subject to the terms and conditions of this Limited Warranty (“THE WARRANTY”). In the event of a warranty claim, customer shall pay for the shipping costs both to and from ProteShea. Customer assumes full liability for loss and/or damage to the USB-UART during the warranty claim.

LIMITATION OF WARRANTY. The warranty set forth below, applies only to the original customer and is based solely on the judgment and discretion of ProteShea. The warranty does not cover bent or damaged connector pins. ProteShea shall not be liable and this warranty shall not apply if any defects or damages are caused by or result from, without limitation, modifications to the USB-UART by anyone other than ProteShea, accident, abuse, mishandling, normal wear and tear, or irresponsible use of the USB-UART. PROTESHEA SPECIFICALLY DISCLAIMS THE WARRANTY FOUND IN UCC SECTION 2-312(3) THAT THE USB-UART SHALL BE DELIVERED FREE OF THE RIGHTFUL CLAIM OF ANY THIRD PERSON BY WAY OF INFRINGEMENT. EXCEPT FOR THE EXPRESSED WARRANTY SET FORTH IN THIS AGREEMENT, PROTESHEA DISCLAIMS ANY AND ALL OTHER EXPRESSED OR IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WHETHER WRITTEN OR ORAL.

LIMITATION OF LIABILITY. ProteShea’s aggregate liability for any and all causes relating to the use or possession of the USB-UART, regardless of the form of the claim, shall be limited to the sum of \$50 US dollars, whether arising out of negligence, tort, strict liability, contract, breach of

agreement, or otherwise. IN NO EVENT SHALL PROTESHEA BE LIABLE FOR – AND THE CUSTOMER OR ANY OTHER PARTY SHALL NOT BE ENTITLED TO – CONSEQUENTIAL, COMPENSATORY, EXEMPLARY, SPECIAL, PUNITIVE, INCIDENTAL, DIRECT, OR INDIRECT DAMAGES ARISING OUT OF THE USE OR POSSESSION OF THE USB-UART, INCLUDING, WITHOUT LIMITATION, THE VALUE OF THE CONTENTS OF THE USB-UART, INJURY, LOST PROFITS OR REVENUE, LOSS OF EQUIPMENT, OR OTHER COMMERCIAL OR ECONOMIC LOSS, WHETHER OR NOT THE POSSIBILITY OF SUCH LOSSES OR DAMAGES HAS BEEN DISCLOSED TO PROTESHEA.

LIMITATION OF DAMAGES. ProteShea’s aggregate liability for any and all damages to the customer resulting from the use or possession of the USB-UART shall not exceed the sum of \$50 US dollars regardless of whether the claim giving rise to such damages is based upon negligence, tort, strict liability, contract, or otherwise.

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ARBITRATION. ANY AND ALL CLAIMS OR DISPUTES BETWEEN PROTESHEA AND CUSTOMER RELATING IN ANY WAY TO THESE TERMS OR THE SERVICES OR PRODUCTS (INCLUDING BUT NOT LIMITED TO THE USB-UART) PROVIDED BY PROTESHEA MUST BE RESOLVED IN BINDING ARBITRATION RATHER THAN IN COURT. IN ARBITRATION, THERE IS NO JUDGE OR JURY, AND COURT REVIEW OF AN ARBITRATION AWARD IS LIMITED. THE ARBITRATOR CAN AWARD ANY DAMAGES OR RELIEF ON YOUR INDIVIDUAL CLAIM THAT A COURT OF LAW COULD, INCLUDING INDIVIDUAL INJUNCTIVE RELIEF AND ATTORNEYS' FEES WHEN AVAILABLE UNDER THE GOVERNING LAW. ALL ARBITRATIONS WILL BE CONDUCTED ON AN INDIVIDUAL BASIS, AND THERE SHALL BE NO CLASS ACTIONS IN ARBITRATION. CUSTOMER AGREES THAT ANY ARBITRATION WILL OCCUR IN THE COUNTY OF SAINT LUCIE, FLORIDA.