Multi Voltage USB to USART Converter board

Version 1.0
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Background

This USB-2-USART module is designed to quickly adapt to any USART interfaced device/module (example: USART based Video/Still cameras, WiFi Modules, Blue tooth Modules, RF Communication Modules, etc) without putting too much effort in rigging hardware. This module also helps to quickly start software/driver development for USART based modules in any embedded electronic system.

We developed this product for our in-house requirements, to quickly evaluate any sensors/devices or modules which have a USART interface. In the process, we thought up of features and interfaces that would reduce the time to quickly rig up a USB-2-USART interface to any electronic modules that we buy off the shelf. And we realized this module maybe of use to any embedded/electronics professionals to accelerate their electronic design and embedded software development cycles.

Finally we evolved this present version which is very versatile and can handle any USART voltage levels below 5V and packaged it into a product form for commercial use.

1. CP2102 [1] based USB to USART[2]
    a) USB Specification 2.0 compliant; full-speed (12 Mbps)
2. Supports up to 921600 baud rates
3. Virtual COM Port drivers for the module
    a) Si-Labs driver (Link here)
    b) Works with existing COM port PC Applications
    c) Royalty-free distribution license
    d) Supported Operating Systems:
        i. Windows 8/7/Vista/Server 2003/XP/2000
        ii. Mac OS-X/OS-9
        iii. Linux
4. All Voltage levels USART support upto 5V DC
    a) In-built 5V (TTL) Levels Support
    b) In-built 3.3V Levels support
        i. Option to supply 5V for power supply in Low voltage headers, although USART operates at 3.3V or lower.
    c) External Power supply support for any other voltage (Example: 1V, 1.5V) USART
5. Board Powered via USB
        i. (Certain modules with USART interface require 5V power supply although the USART pins operated at 3.3V)
        ii. Built-in High Supply voltage in LV header Alert indicator
6. Supplied with all necessary cables/connectors for experimentation
    a) USB A to B cable
    b) 4Pin to 4PIN RMC Headers -2 Nos
    c) Berg Stick Connectors (M-M, M-F, F-F) - 4 Sets each
    d) Shorting Jumpers

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[1]**CP2102:** Silicon Labs made CP2102 is one of the most commonly used USB 2 USART chips.
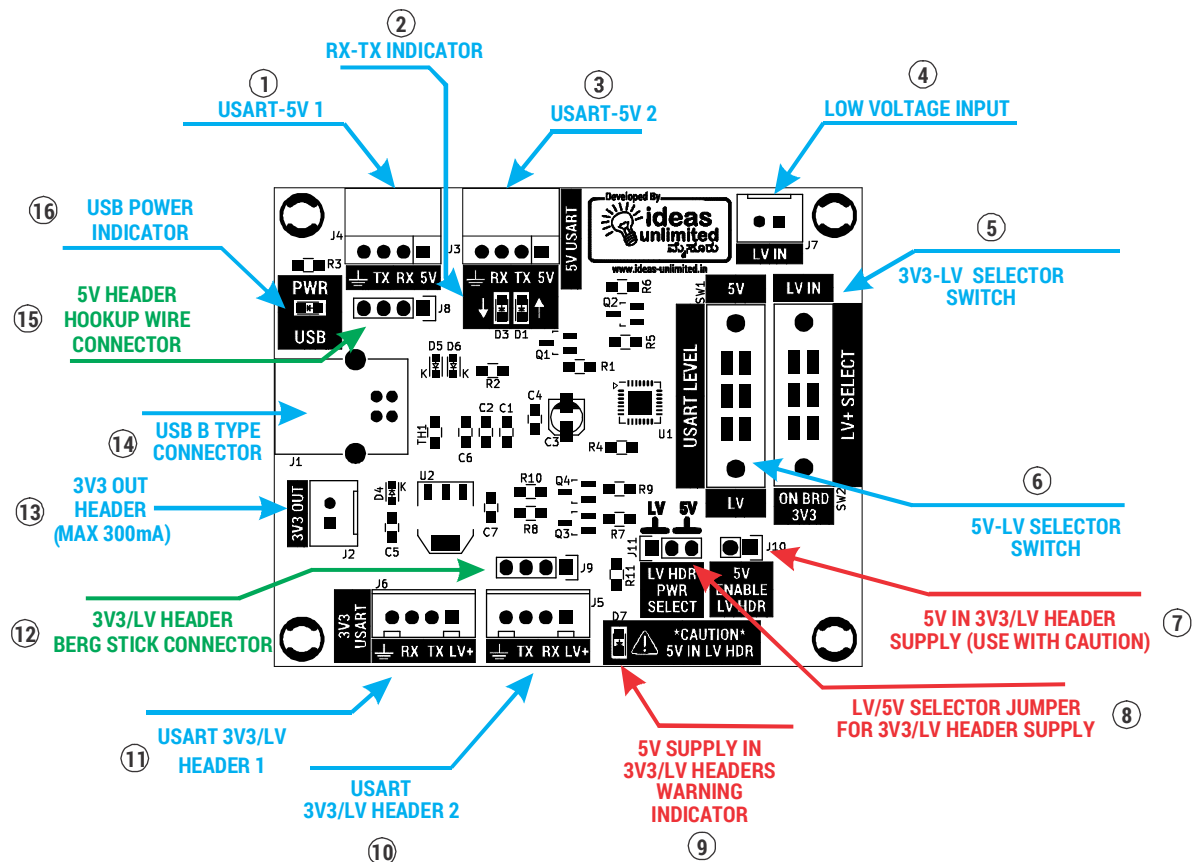[2]**USART:** Universal Synchronous/Asynchronous Reciever and Transmitter.

Module Top View

Figure 1: Top View of the Mulit voltage USB 2 USART module

Ref	Num	Type	Connector/Indicator Name	Function	Notes/comments
J4	1	Connector	USART - 5V 1	TTL/5V Level USART port	
-	2	Indicator	RX-TX INDICATOR	Receive or transmit activity indicator	Usually on, switches off when data transmits.
J3	3	Connector	USART - 5V 2	TTL/5V Level USART port with RX/TX swapped	
J7	4	Connector	LOW VOLTAGE INPUT	Supply Input for any non standard USART operating voltage	
SW2	5	Switch	3V3-LV SELECTOR SWITCH	Selector switch to select between on-board 3V3 or external LV level	
SW1	6	Switch	5V-LV SELECTOR SWITCH	Selector switch that can enable either 5V/TTL level port or Low Voltage port	

J10	7	Jumper	5V IN 3V3/LV HEADER SUPPLY	(Use with Caution) Shorting this will supply 5V to the LV USART header.	Some USART enabled devices (especially used with Arduino) typically have 5V supply, by 3V3 tolerant RX/TX Pins. Shorting this jumper will enable 5V supply to LV USART port.
J11	8	Jumper	LV/5V SELECTOR JUMPER FOR 3V3 HEADER	Jumper option to select supply LV header's power supply with either 5V or LV	
D7	9	Indicator	5V SUPPLY IN 3V3/LV HEADERS	Indicates that 5V is used as input in LV Header	Switches on when 5V is supplied to LV Header
J5	10	Connector	USART 3V3/LV HEADER 2	LV/3V3 Level USART port	
J6	11	Connector	USART 3V3/LV HEADER 1	LV/3V3 Level USART port with RX/TX swapped	
J9	12	Wire Connectors	3V3/LV HEADER BERG STICK CONNECTOR	Same as LV/3V3 Level USART Port but with Hook-Up wire Connector	
J2	13	Connector	3V3 OUT HEADER	Output voltage of 3.3 volts form On-Board Regulator	
J1	14	Connector	USB B TYPE CONNECTOR		
J8	15	Wire Connectors	5V HEADER HOOKUP WIRE CONNECTOR	Same as TTL/5V Level USART Port but with Hook-Up wire Connector	
-	16	Indicator	USB POWER INDICATOR	Indicates that Board is Powered up/Working.	

Driver Installation

This section provides the steps required to install drivers on Windows 7/10/11 and Linux

Driver installation on Windows

https://www.silabs.com/developers/usb-to-uart-bridge-vcp-drivers?tab=downloads

For detailed driver installation steps refer document **Multi Voltage USB to USART Converter board User Manual**. TBD LINK of user manual.

Driver installation on Linux

> **Note:** Recent versions of the Linux kernel include support for the CP2102 USB-to-USART Bridge Controller as part of the usb-serial driver, so your CP2102 USB 2 USART Module should work right out of the box.

For other variants of Linux other than Ubuntu, the Linux package can be found at this link.

https://www.silabs.com/documents/public/software/CP210x_Linux.bin

Multi Voltage USB to USART Converter board User Manual

Examples

Example 0: Basic functional Testing USB to USART function with a Loop-back connector
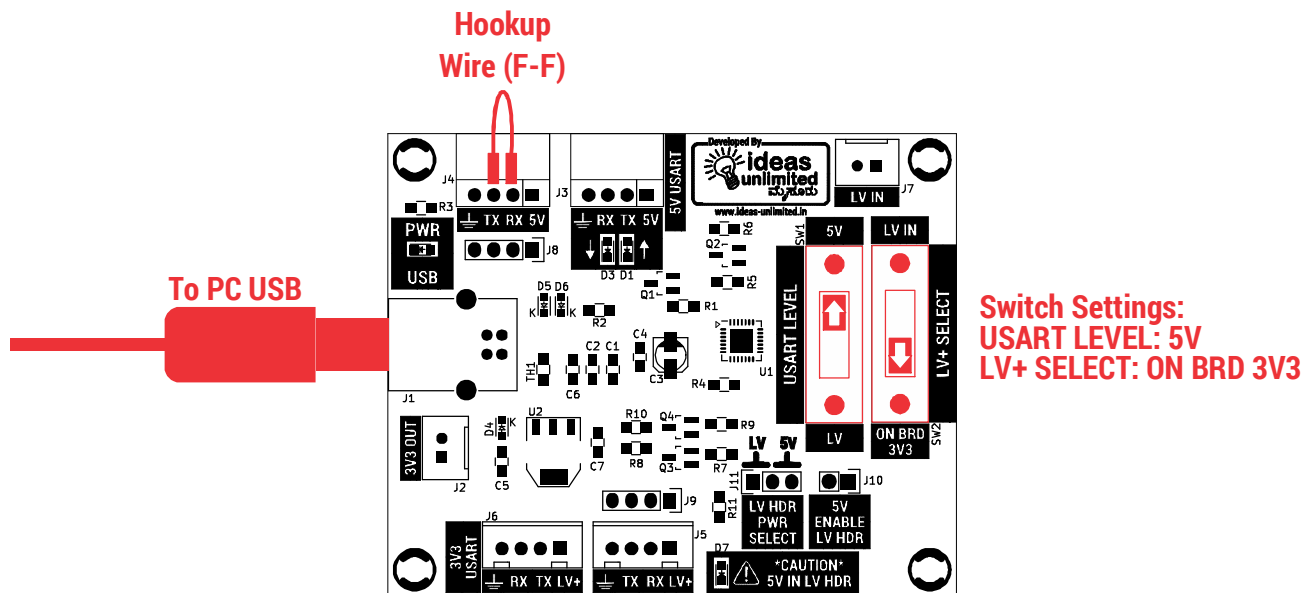
Testing 5V/TTL level USART with Loop-back connector

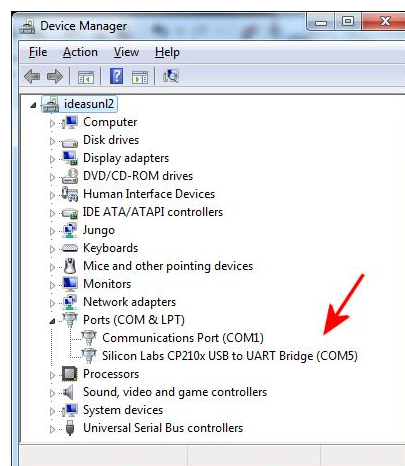**Figure 2: Settings to test 5V port Loop back**

Step 1: In the USART board keep the
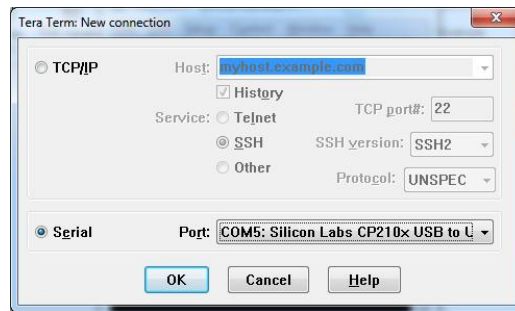- "USART LEVEL" switch to 5V

Step 2: Ensure you have installed the CP2102 USB to USART driver already in your computer. If driver is not installed, follow instructions in *"Driver Installation"* section and install the driver.

Step 3: Connect your USART to PC through USB. The Power Indicator and TX/RX indicators, on the PCB should glow.
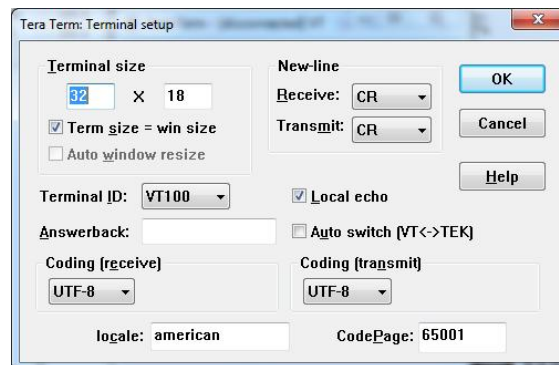
Step 4: Now, open Control Panel->Hardware and Sound->Device manager. You should be able to see the Silicon Labs CP210X USB to UART Bridge mounted as a new COM Port. Note down the COM Port number.

Step 5: Open TeraTerm on your system. Connect to the COM PORT you noted down in Device manager.


Step 6: Select Setup-> Terminal option. Make sure "Local Echo" is turned on in the "Terminal Setup" settings.
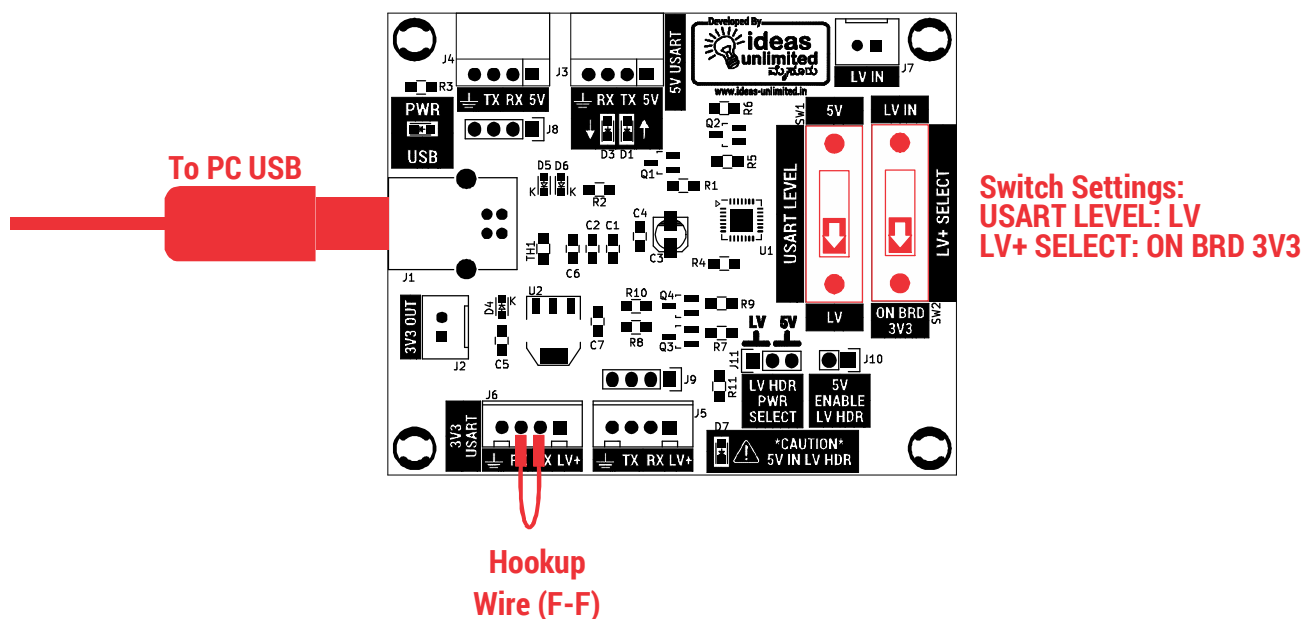

Step 7: Short TX and RX using a hookup (Female to Female) wire in J4 or J3 as shown in *"Figure 2: Settings to test 5V port Loop back"*

Step 8: Whatever the Input you give, it should reflect the same as the output in TeraTerm. (should get duplicated as you type). This means the USART is running okay.
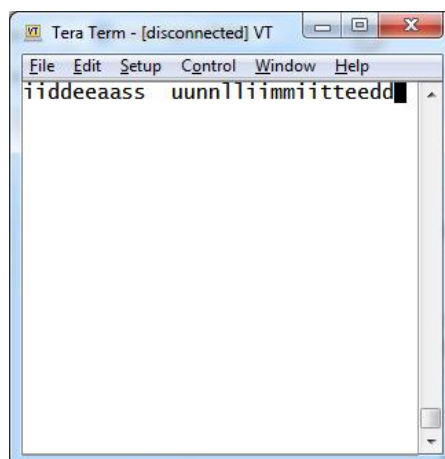
Testing 3V3 level USART with Loop-back connector
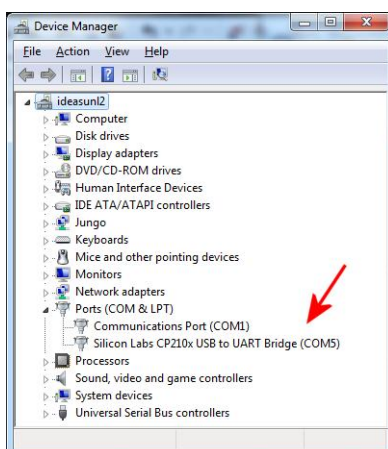

Figure 3: Settings to test 3V3 port Loop back

Step 1: In the USART board keep the
- "USART LEVEL" switch to ON BRD 3V3.

Step 2: Ensure you have installed the CP2102 USB to USART driver already in your computer. If driver is not installed, follow instructions in *"Driver Installation"* section and install the driver.
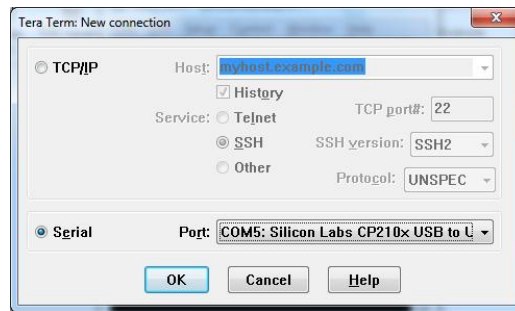
Step 3: Connect your USART to PC through USB. The Power Indicator and TX/RX indicators, on the PCB should glow.

Step 4: Now, open Control Panel->Hardware and Sound->Device manager. You should be able to see the Silicon Labs CP210X USB to UART Bridge mounted as a new COM Port. Note down the COM Port number.
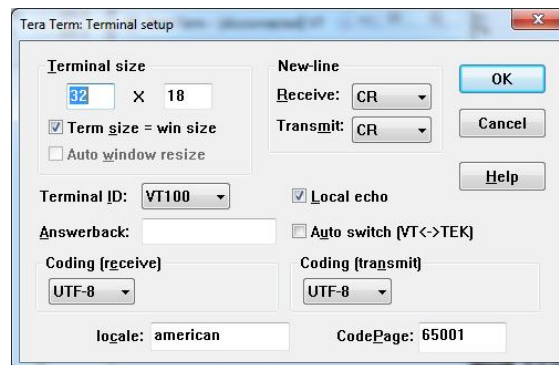
Step 5: Open TeraTerm on your system. Connect to the COM PORT you noted down in Device manager.


Step 6: Select Setup-> Terminal option. Make sure "Local Echo" is turned on in the "Terminal Setup" settings.

Step 7: Short TX and RX using a hookup (Female to Female) wire in J5 or J6 as shown in "*Figure 3: Settings to test 3V3 port Loop back*"

Step 8: Whatever the Input you give, it should reflect the same as the output in TeraTerm. (should get duplicated as you type). This means the USART is running okay.
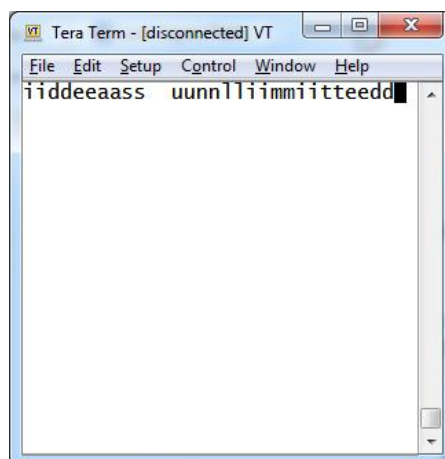
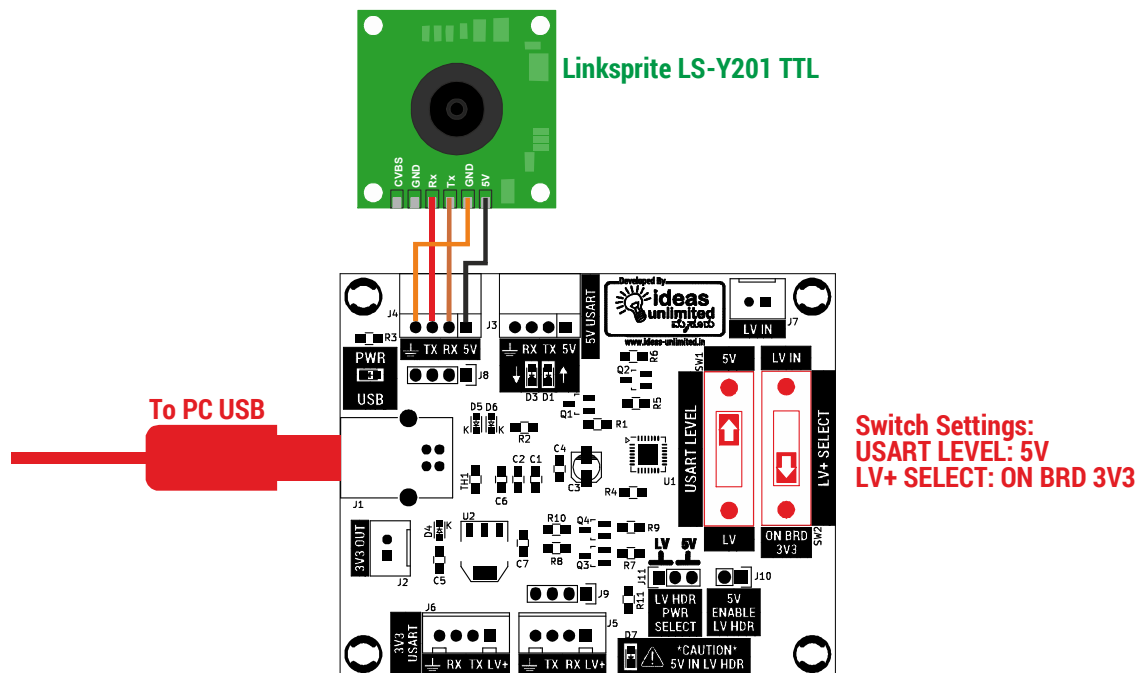# Example 1: Connecting to Linksprite LS-Y201 TTL camera (5V Supply, 5V tolerant USART)

Figure 3 : Wiring diagram to connect LS-Y201 TTL camera to PC for debugging/driver development

Example 2: Connecting to Ai Thinker BW16 WiFi module (3V3 Supply, 3V3 tolerant TX/RX lines)
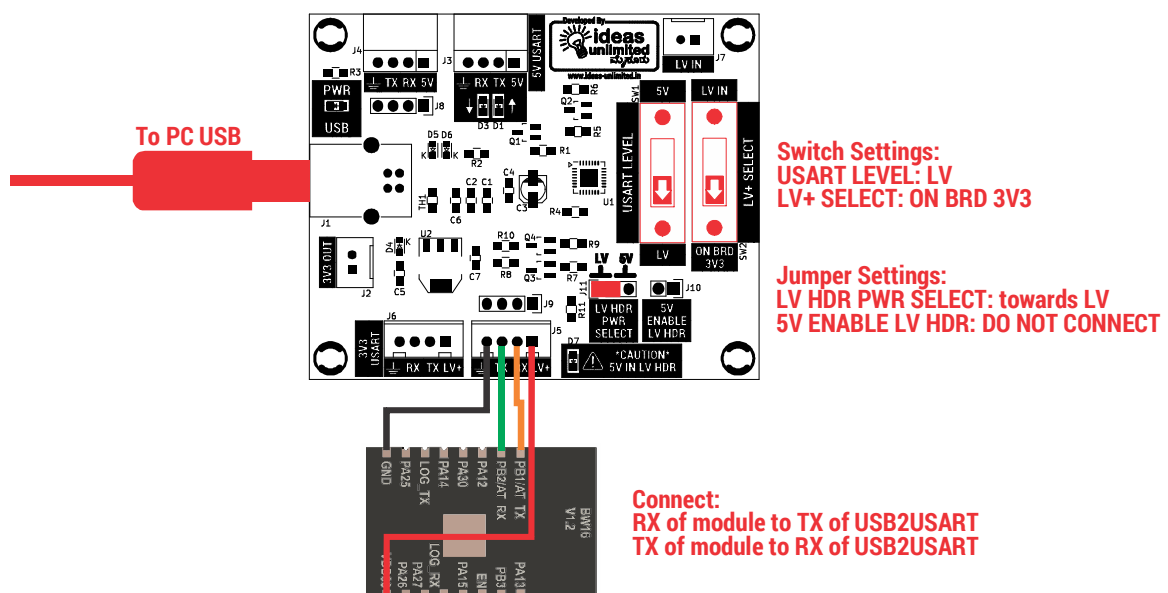

Figure 4: Wiring diagram to connect BW-16 WiFi Module (2.4/5.8GHz) to PC for debugging/driver development

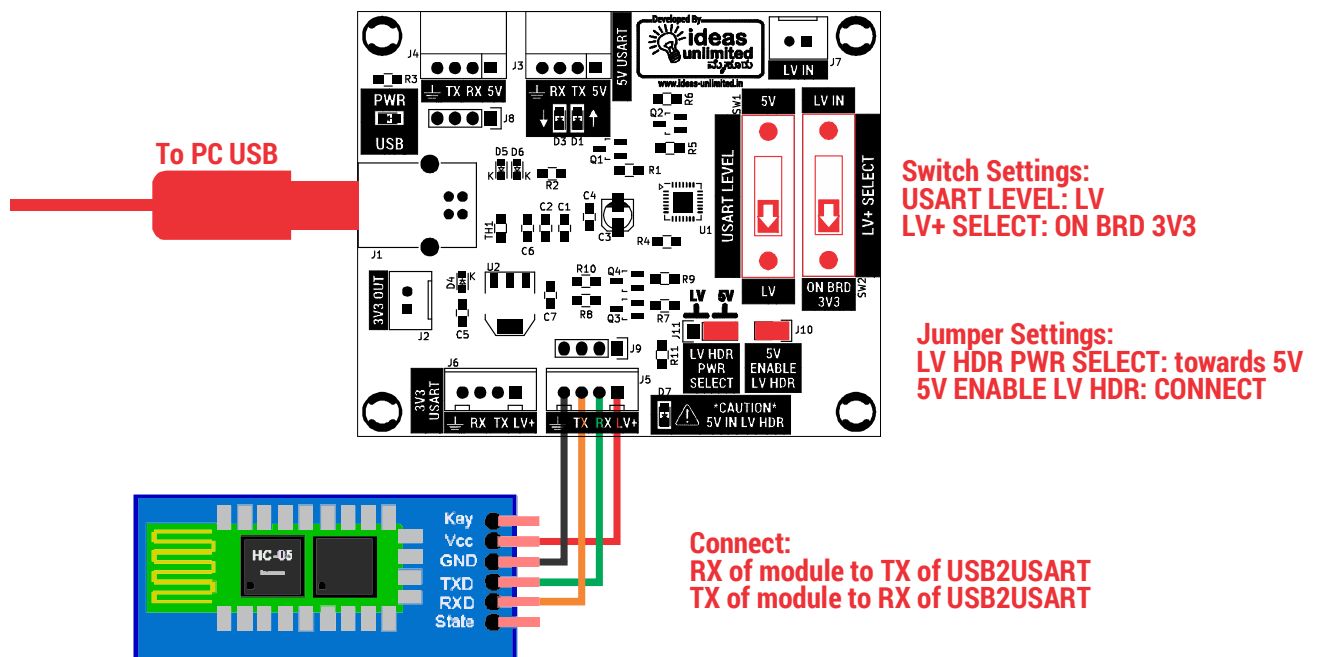# Example 3: Connecting to a HC-05 (5V supply, USART pins are 3V3) tolerant

To PC USB

Switch Settings:
USART LEVEL: LV
LV+ SELECT: ON BRD 3V3

Jumper Settings:
LV HDR PWR SELECT: towards 5V
5V ENABLE LV HDR: CONNECT

Connect:
RX of module to TX of USB2USART
TX of module to RX of USB2USART

Figure 5: Wiring diagram to connect HC-05 Bluetooth module, which requires 5V Supply but RX/TX pins are 3V3 tolerant

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