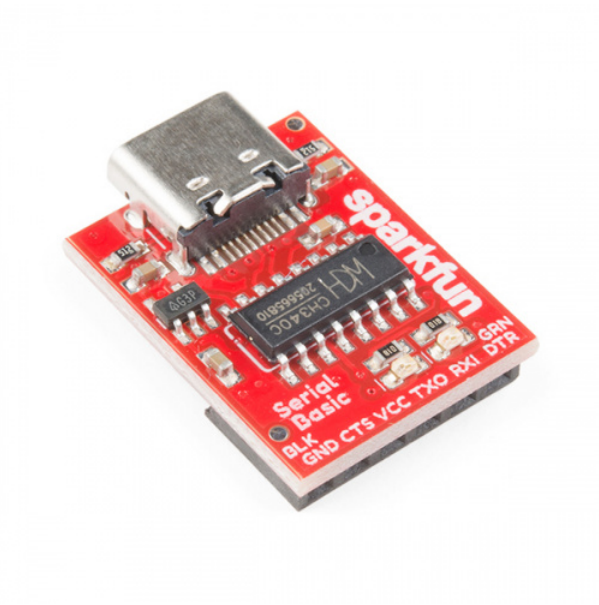
SparkFun Serial Basic CH340C Hookup Guide

Introduction

The latest iteration of the SparkFun Serial Basic Breakout takes advantage of USB-C and is an easy-to-use USB-to-Serial adapter based on the *CH340C* IC from WCH. With USB-C you can get up to three times the power delivery over the previous USB generation and has the convenient feature of being *reversible*. The product works with 5V and 3.3V systems and should auto install on most operating systems without the need for additional drivers. The Serial Basic uses the CH340C IC to quickly and easily convert serial signals to USB. It’s a great **lower-cost** alternative to the extremely popular FTDI Basic.



SparkFun Serial Basic Breakout - CH340C and USB-C
DEV-15096

Required Materials

At a minimum, you will need the following materials to follow along with the tutorial. You may not need everything though depending on what you have and your setup. Add it to your cart, read through the guide, and adjust the cart as necessary.

Jumper Wires - Connected 6" (M/M, 20 pack)

◉ PRT-12795

USB 3.1 Cable A to C - 3 Foot

◉ CAB-14743

Suggested Reading

Before you begin it may be worth looking at the basics of Serial Communication. Do you have a favorite terminal program yet? No? Take a look at the Serial Terminal Basics tutorial which will give you a brief introduction to popular Terminal programs.

Serial Communication

Asynchronous serial communication concepts: packets, signal levels, baud rates, UARTs and more!

Serial Terminal Basics

This tutorial will show you how to communicate with your serial devices using a variety of terminal emulator applications.

How to Work with Jumper Pads and PCB Traces

Handling PCB jumper pads and traces is an essential skill. In this tutorial, you will learn how to cut a PCB trace and add a solder jumper between pads to reroute connections. You will also learn how to repair a trace with the green wire method if a trace is damaged.

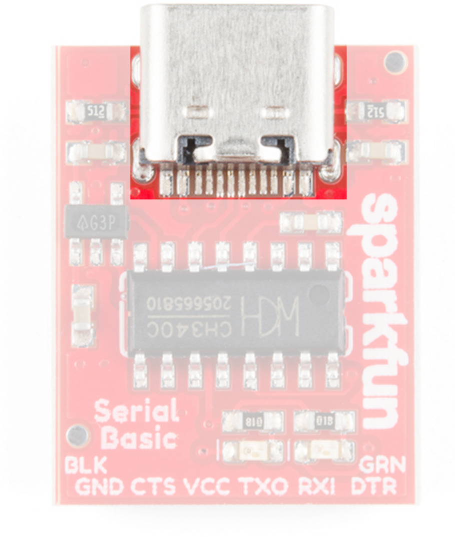
Serial Basic Overview

The pinout of the Serial Basic mimics the common $\overline{\text{DTR}}$/RX/TX/VCC/$\overline{\text{CTS}}$/GND pinout found on hundreds of FTDI-to-USB derivatives.

Pin Label	**Input/Output**	**Description**
$\overline{\text{DTR}}$	Output	Data Terminal Ready, Active Low
RXI	Input	Serial Receive
TXO	Output	Serial Transmit
VCC	Supply Output	Power supply **3.3V (Default)** or 5V
$\overline{\text{CTS}}$	Input	Clear To Send, Active Low
GND	Supply Output	Ground (0V) supply

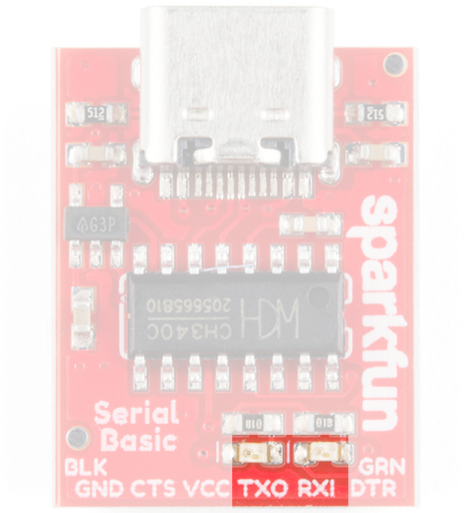
USB-C

USB-C gives you the potential of more power than the previous generation of USB. USB-C is used to power everything from laptops to low powered micro controllers and has the amazing capability of being reversible.



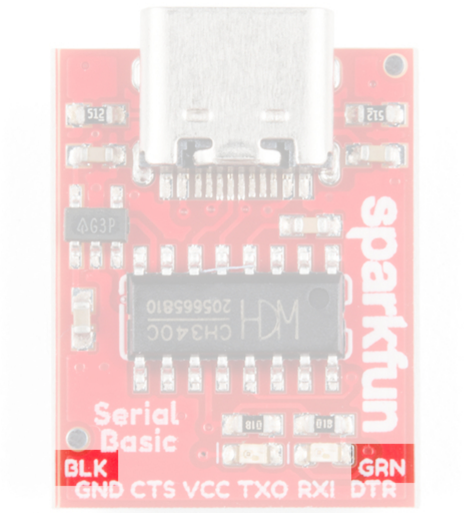
LEDs

The two LEDs on the board are connected to TX (Green) and RX (Yellow) and are correctly aligned to the silk header labels: `RXI` and `TXO` . This is a quick and handy way to see the serial traffic.

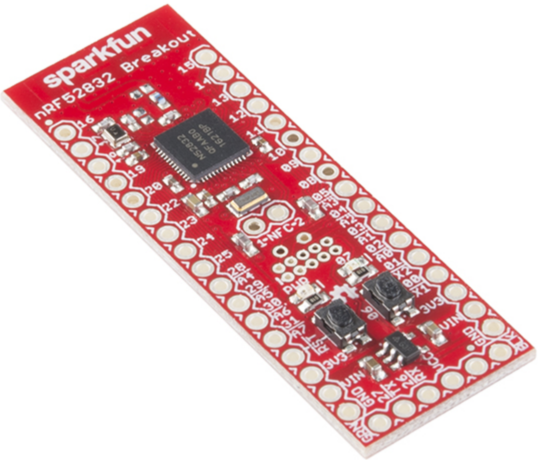


Alignment Markers

The `GRN` and `BLK` silk in the corners opposite of the USB-C connector, is there to help you align the board properly with products that use these same orientation indicators.



The Serial Basic mates seamlessly with products that use the standard serial connection. If you see a board with the `BLK` and `GRN` labels, then you know it will be compatible with the **Serial Basic**.



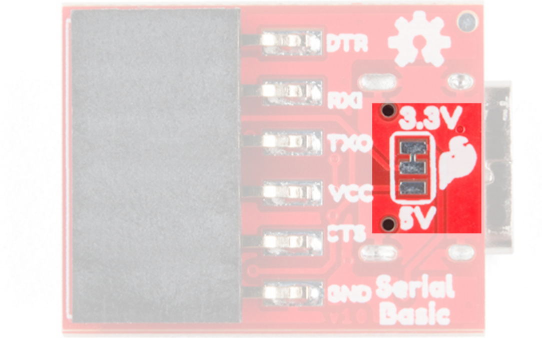
See the GRN and BLK labels on this nRF52832 Breakout?

Where did GRN and BLK come from? Way back in 2008, when we created the Arduino Pro Mini, we needed to have a pinout to allow serial bootloading. At the time, the best USB to TTL Serial device was the FT232 Cable. Its unpolarized connector could be flipped either way so we added the words **GRN** and **BLK** to the PCB to let folks know how to line up the colored wires. The practice stuck! Now, many boards use this standard.

The cable with colored wires

Voltage Selection Jumper

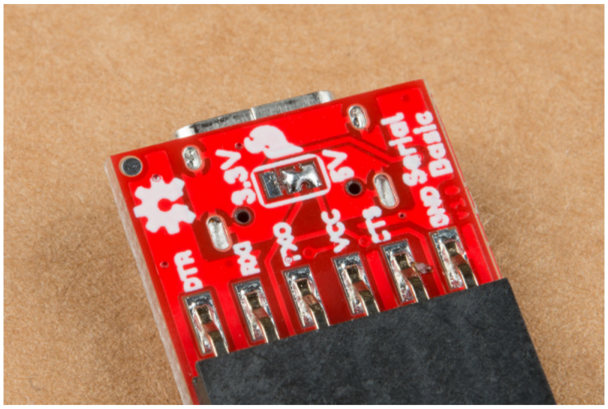
There is a jumper on the underside of the board that controls the output voltage on the VCC pin. By default, the board outputs **3.3V** and has **3.3V signals**.



There is a small trace connecting the middle pad and the top pad labeled `3.3V`.

When the jumper is set to 3.3V, the board uses an on board 3.3V regulator capable of sourcing 600mA. If you attempt to pull more than 600mA, the regulator will go into short-circuit shutdown where it will only output 150mA.

You can change the board's output and signal to 5V by cutting the trace between the center and `3.3V` labeled pad and putting solder on the center and `5V` labeled pad. This will change the board's output to **5V** on the VCC pin with **5V signals**.

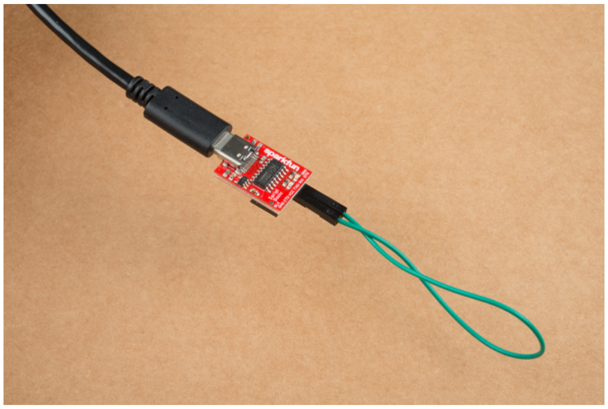


When the jumper is set to 5V, the board will source as much power as your USB port will provide. With USB-C this can be up to 1.5Amps but depending on what is providing the power and the capabilities of your cable, you can get up to 3 Amps.

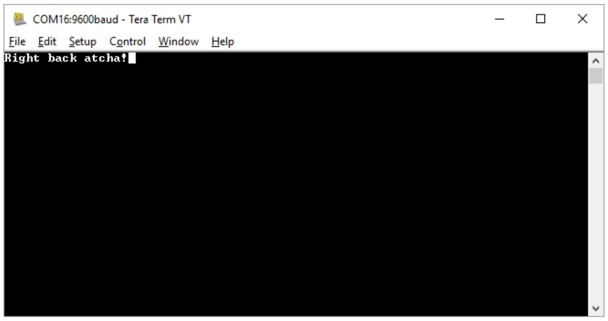
Hardware Test

To connect the board to a computer, you will need a USB-C cable. Plug the USB-C cable into a USB port on your computer and the other end into the Serial Basic. Your computer should automatically install the necessary drivers and create a COM port on your computer. If you are prompted for drivers, please see the Drivers section.

The quickest and easiest way to make sure everything is working is to do a TX/RX loop-back. To do this, insert a jumper wire between **TX** and **RX** as shown below. Anything that is transmitted from the TX pin will be *echoed* back to the RX pin.



Now that you've got that plugged in, open your favorite terminal program. Select the COM port that the Serial Basic is assigned to, and connect. When you type a character, you should see each character you type echoed back in the terminal and the RX and TX LEDs will flash as you type.



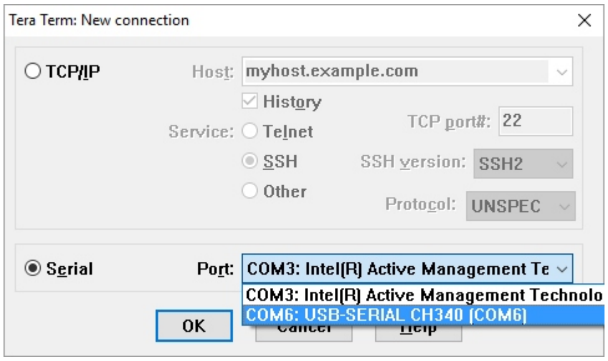
COM16:9600baud - Tera Term VT
File Edit Setup Control Window Help

```
Right back atcha!
```

Success!

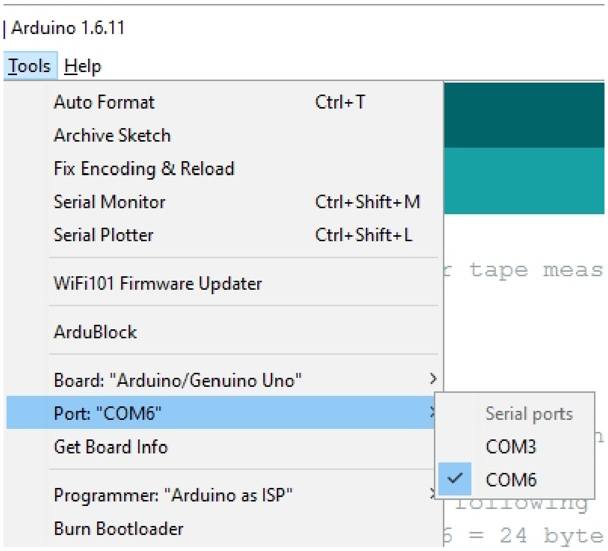
Which COM Port Do I Need?

Most programs will show you a description of the USB device that created the port. Look for the port associated with **CH340C**.



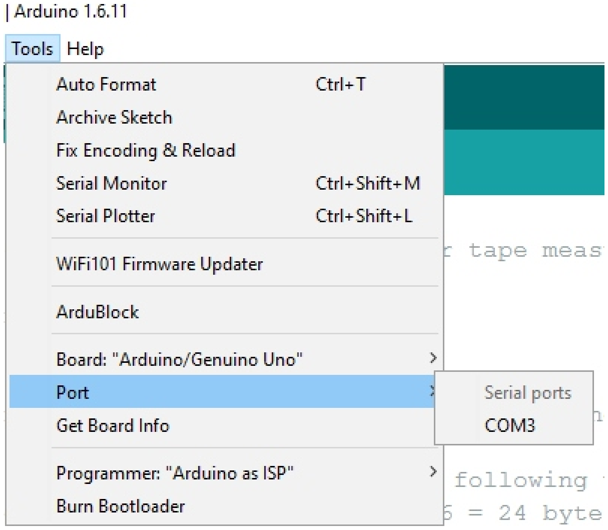
Tera Term: New connection
TCP/IP
Host: myhost.example.com
History
Service:
Telnet
SSH
Other
TCP port#: 22
SSH version: SSH2
Protocol: UNSPEC
Serial
Port: COM3: Intel(R) Active Management Te
COM3: Intel(R) Active Management Technolo
COM6: USB-SERIAL CH340 (COM6)
OK
Cancel
Help

If you're using the Arduino IDE, figuring out which COM port is the one you want is more difficult. Here's the quick way to figure it out: attach the Serial Basic to your computer, and check which COM ports are listed. In the image below, we have two ports. Now close the `Tool` menu by clicking on the main Arduino IDE window.



Which COM port should I select?

Unplug the Serial Basic, and re-open the **Tools** -> **Ports** submenu. You will see one of the serial ports is missing. That's the one you want! Plug your Serial Basic back in, and use that COM port.



Note: You need to close and re-open the tools menu before Arduino will refresh the port list. If you have the tool menu open simply click on the main window, then click back on **Tools** -> **Port**.

Drivers (If You Need Them)

The Serial Basic has been tested on Windows 7, Windows 8.x, Windows 10, Linux Mint, and OSX Yosemite, El Capitan, and Sierra. These operating systems have the CDC drivers pre-installed, which means you shouldn't need to install any extra software. However, there are a wide range of operating systems out there, so, if you run into driver problems, you can get drivers here.

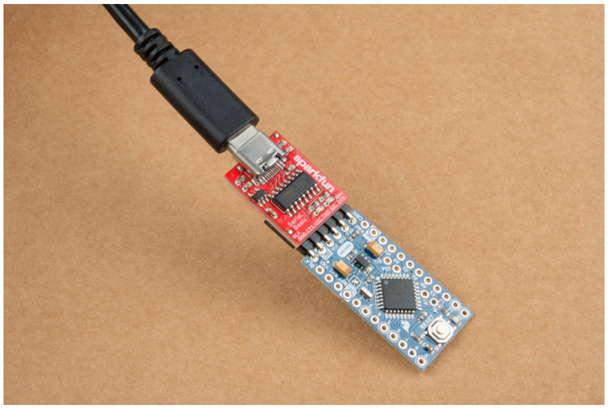
- Windows : Driver version 3.4 (2016-09-27)
- Linux : Driver v1.4 (2015-09-12)
- Mac : Driver v1.3 (2016-09-27)

The CH340G is made by WCH. You can find the latest version of their drivers here, but most of their pages are in Mandarin.

WCH: CH340 DRIVERS

Resources and Going Further

Once you've got serial communication working, you're ready to start playing with serial projects. Consider connecting to a GPS module like the GP-20U7, taking a look at our tutorial on GPS and watching the serial strings roll by. Or, you can use the *Serial Basic* to program and debug devices like the Arduino Pro Mini. There are tons of devices that use serial to communicate, so go explore!



The Serial Basic programming an Arduino Pro Mini

> **Heads up!** The image shows the Serial Basic connected to an Arduino Pro Mini 3.3V/8MHz. If you are using an Arduino Pro Mini 5V/16MHz, make sure to adjust the jumper pad for the voltage selection on the back of the Serial Basic.

Check out these other resources for the Serial Basic.

- Schematic (PDF)
- Eagle Files (ZIP)
- Datasheet (PDF) (CH340G)
- WCH: CH340 Drivers
    - Windows (ZIP)
    - Linux (ZIP)
    - Mac (ZIP)
- GitHub

Check out these other great SparkFun tutorials.

USB Type A Female Breakout Hookup Guide

Getting Started with OBD-II

An above-and-beyond example using the USB Type A Female Breakout board.

A general guide to the OBD-II protocols used for communication in automotive and industrial applications.

Qwiic Differential I2C Bus Extender (PCA9615) Hookup Guide

Learn how to extend the range of your I2C communication bus with the Qwiic differential I2C bus extender (PCA9615) breakout board.

New!

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Need some inspiration for your next project? Check out some of these related tutorials:

Serial Communication

Asynchronous serial communication concepts: packets, signal levels, baud rates, UARTs and more!

GPS Basics

The Global Positioning System (GPS) is an engineering marvel that we all have access to for a relatively low cost and no subscription fee. With the correct hardware and minimal effort, you can determine your position and time almost anywhere on the globe.

Using the Arduino Pro Mini 3.3V

This tutorial is your guide to all things Arduino Pro Mini. It explains what it is, what it's not, and how to get

Serial Terminal Basics

This tutorial will show you how to communicate with your serial devices using a variety of terminal emulator started using it.

applications.