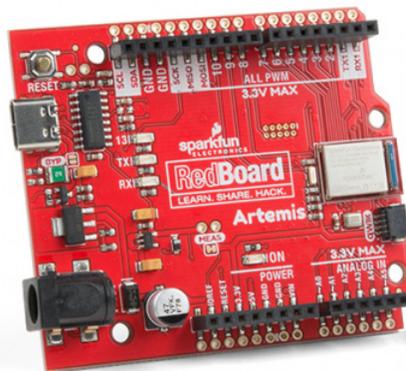


Hookup Guide for the SparkFun RedBoard Artemis

Introduction

The SparkFun RedBoard Artemis encapsulates all the lessons we've learned through the years of improving on the original Arduino Uno while adding in the powerful Artemis module so that you can easily use the Cortex-M4F. Let's dive in!



SparkFun RedBoard Artemis

© DEV-15444

Product Showcase: SparkFun RedBoard Artemis Boards



Product Showcase: SparkFun Artemis Module BLE Cortex-M4F



Required Materials

You'll need the RedBoard Artemis and a USB C cable. Any USB C cable should work, including the one that probably came with your phone charger. If you don't have a cable you can get a 3 foot one [here](#) or a fancy reversible one [here](#).



SparkFun RedBoard Artemis

🕒 DEV-15444



Reversible USB A to C Cable - 2m

🕒 CAB-15424

Suggested Reading

If you aren't familiar with the Qwiic system, we recommend reading [here](#) for an overview.

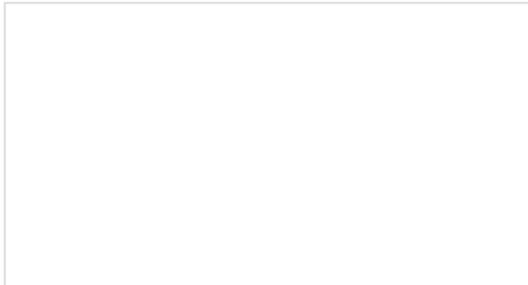


Qwiic Connect System

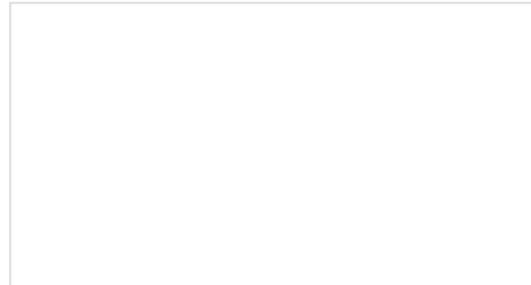
Product Showcase: SparkFun RedBoard Artemis Qw...



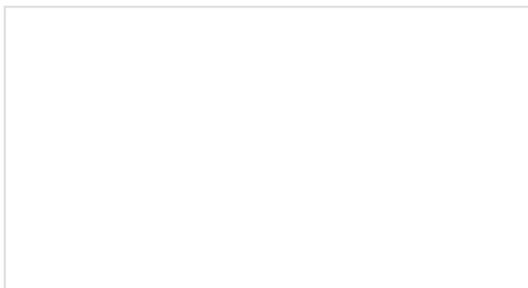
We also recommend checking out these tutorials before continuing:



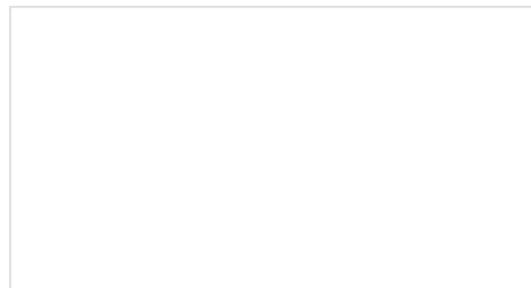
I2C
An introduction to I2C, one of the main embedded communications protocols in use today.



RedBoard Qwiic Hookup Guide
This tutorial covers the basic functionality of the RedBoard Qwiic. This tutorial also covers how to get started blinking an LED and using the Qwiic system.



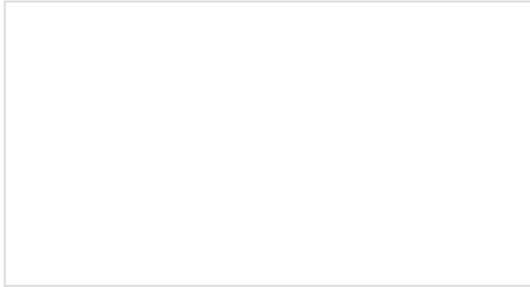
Using SparkFun Edge Board with Ambiq Apollo3 SDK



Designing with the SparkFun Artemis

We will demonstrate how to get started with your SparkFun Edge Board by setting up the toolchain on your computer, examining an example program, and using the serial uploader tool to flash the chip.

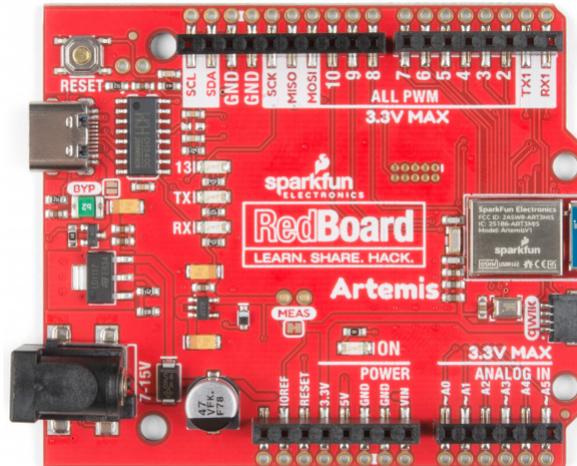
Let's chat about layout and design considerations when using the Artemis module.



Artemis Development with Arduino
Get our powerful Artemis based boards (Artemis Nano, BlackBoard Artemis, and BlackBoard Artemis ATP) blinking in less than 5 minutes using the SparkFun Artemis Arduino Core!

Hardware Overview

If you've ever used an Arduino Uno before you should be pretty familiar with the various female headers and the barrel jack power. If you're new to Arduino boards, check out the SparkFun RedBoard Qwiic tutorial for more information on many of the basic board functions you'll see on the Artemis RedBoard. In this tutorial we'll be covering the unique aspects of the RedBoard Artemis.

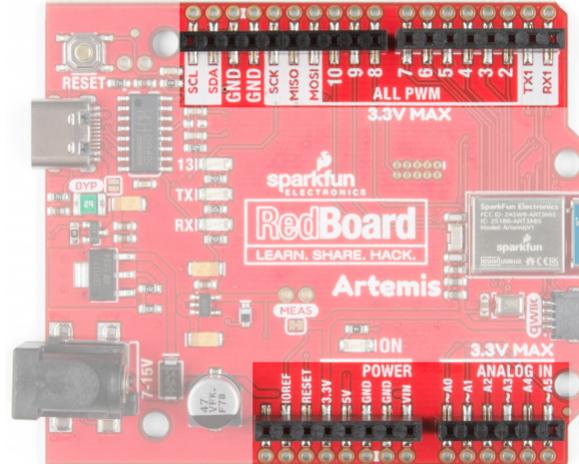


⚡ **Warning:** All pins are **3.3V**. DO NOT expose the pins to 5V.

The ADC on the Artemis is **0-2V**. Exposing an ADC pin to 3.3V will not harm the device but the ADC will saturate returning 16,383 (14-bit) for voltages greater than 2V.

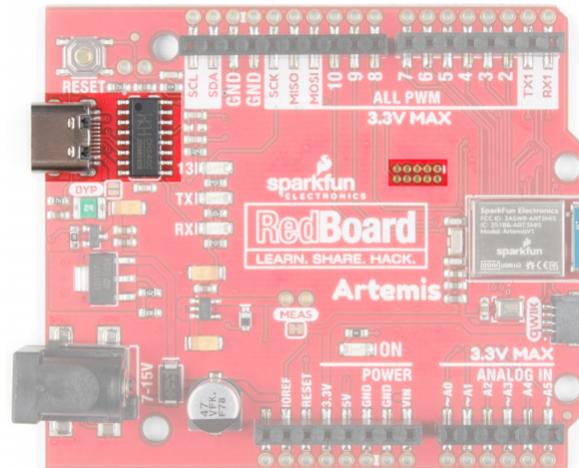
GPIO

Looking at the front of the Artemis RedBoard, you'll notice that alongside the female headers are plated through-holes. We've found that while we enjoy the ease of using the headers, sometimes we just want to solder directly to our board. To that end, we've added the PTH rails. Note that these are NOT all ground pins - these pins have whatever functionality is labeled beside their female header companions.



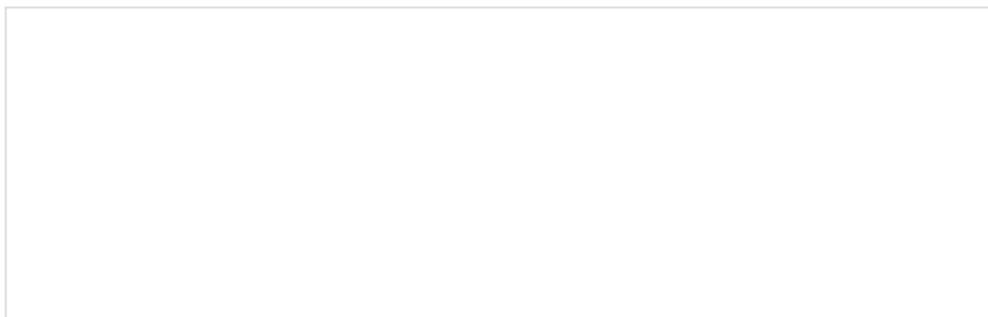
Serial and JTAG Programming

The RedBoard Artemis has two methods for programming. The most common is the USB C connector that operates as a USB to serial bridge. By simply pressing 'Upload' in the Arduino IDE or 'make bootload' from the SDK the firmware on Artemis is updated.



USB-C and JTAG footprints

We use the CH340C on the RedBoard Artemis. The driver should automatically install on most operating systems. However, there is a wide range of operating systems out there. You may need to install drivers the first time you connect the chip to your computer's USB port or when there are operating system updates. For more information, check out our [How to Install CH340 Drivers Tutorial](#).



How to Install CH340 Drivers

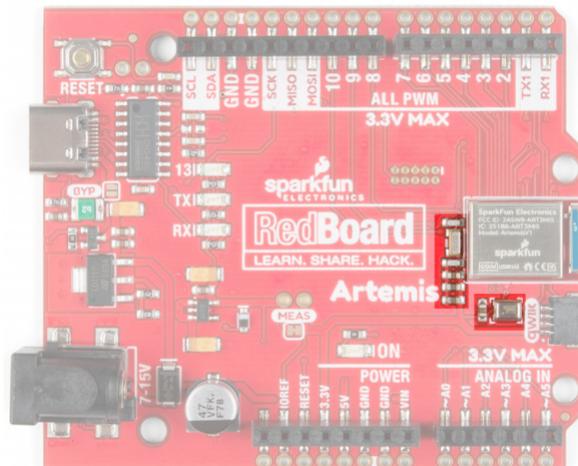
AUGUST 6, 2019

How to install CH340 drivers (if you need them) on Windows, Mac OS X, and Linux.

The second method is JTAG programming. An unpopulated JTAG footprint is available for more advanced users who need breakpoint level debugging. We recommend checking out our JTAG section for the compatible male header and a compatible JTAG programmer and debugger.

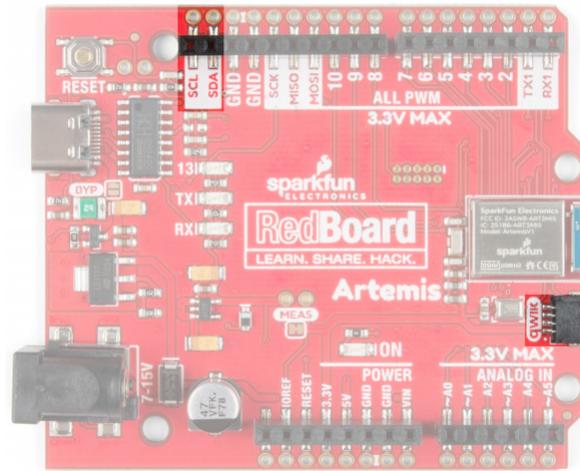
Mic and RTC

The Artemis exceeds at low power voice recognition. To enable this we've included a PDM MEMS microphone on the board. Additionally, the Artemis module can operate an RTC given an external 32kHz crystal so we've included that as well.



Qwiic and I2C

The I²C pins on the Artemis are labeled SDA and SCL. They are controlled in the Arduino IDE using `Wire.begin()`, `Wire.read()`, etc. The same SDA/SCL pins are connected to the Qwiic connector so you can use SparkFun's Qwiic ecosystem (there's over 50 boards and more every week!).



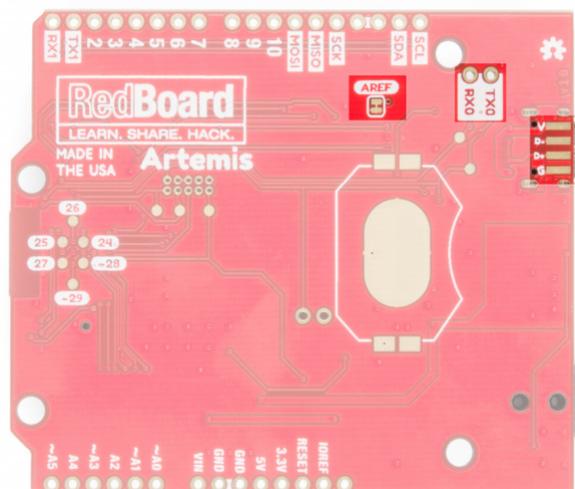
Note: The standard Arduino Uno has SDA/SCL additionally connected to A4/A5. A4/A5 on the Artemis are not I²C related, they are only Analog. SDA/SCL are digital pins 14/15 respectively. A4/A5 can be used as digital pins 20/21 respectively.

Serial0, AREF, and USB Pads

On the rear of the RedBoard are some advanced features. Normally, an AREF pin is located between the SDA and GND pins. The Artemis module has no equivalent pin so we've converted that pin to GND. If you have a shield that utilizes the AREF pin or just want to free it, you can cut the AREF jumper and the labeled 'GND' located between SDA and GND will be left disconnected.

On Artemis, TX0/RX0 are used for bootloading new code and `Serial.println()` statements to the computer's terminal window. The CH340C takes care of the serial to USB conversion. However, if you need access to these pins, they're available. TX0/RX0 can be used as GPIO as well as special functions, but for most applications these pins are left as Serial for bootloading.

For users who are embedding the RedBoard Artemis into an enclosure the USB pads are exposed so that an external USB connector can be located at the edge of the enclosure and wired back to the USB pads.



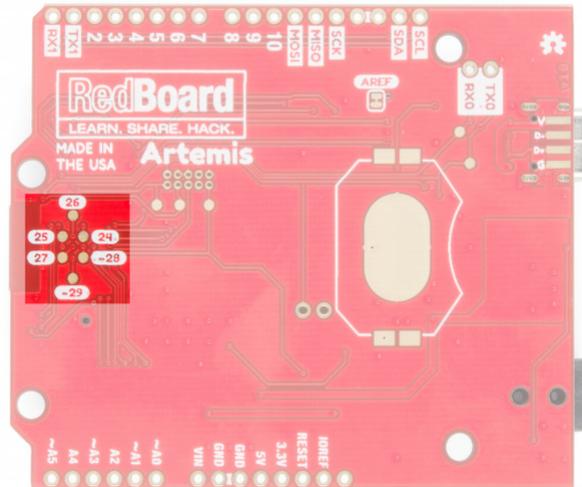
Busmaster Pads

One amazing aspect of the Artemis is the large number of SPI and I²C buses available. We at SparkFun decided that it would be better to have more PWM and ADC pins routed to the female headers on the front of the board, rather than extra I²C and SPI pins. But we just couldn't resist! We've made Wire1/SPI1 and Wire3/SPI3 available

to users through the SMD pads on the bottom of the board. These pins can be used as GPIO if needed and pins 28/29 are PWM enabled as well.

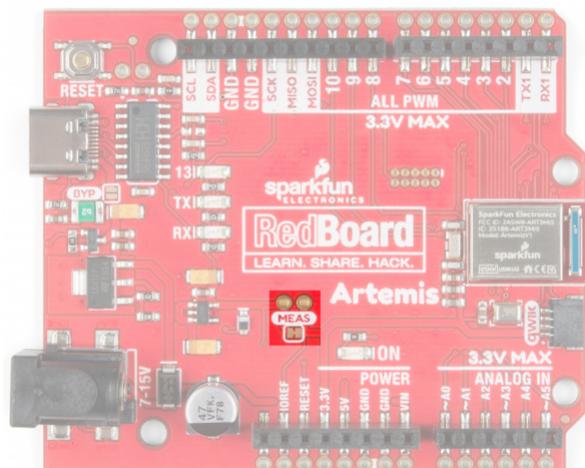
i Advanced Trick: Do you just need a 2nd I²C port? The pins 12/13 can be reconfigured from SPI to be Wire0.

i Note: A 'bus master' is a series of pins that can be either an SPI bus or an I²C bus. For example, pins 8/9 can be SCL1/SDA1 or pins 8/9/10 can be SCK1/MISO1/MOSI1.

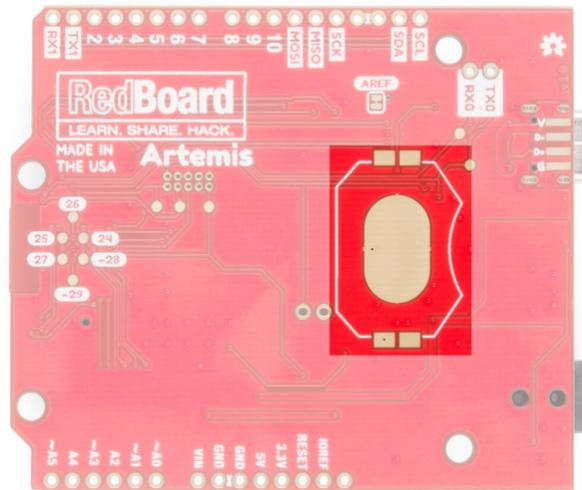


Current Measurement Jumper

The Artemis can run as low as 6 μ A/MHz meaning the module can run at 48MHz at less than half a milliamp. To enable measurements and to isolate the power hungry devices (such as the LM317 voltage regulator) we've added a NC (normally closed) jumper. By cutting the jumper the VDD trace to the module is interrupted. Soldering in a male jumper or wires into the accompanying holes will give you the ability to insert a current meter and precisely monitor how much current your application is consuming.



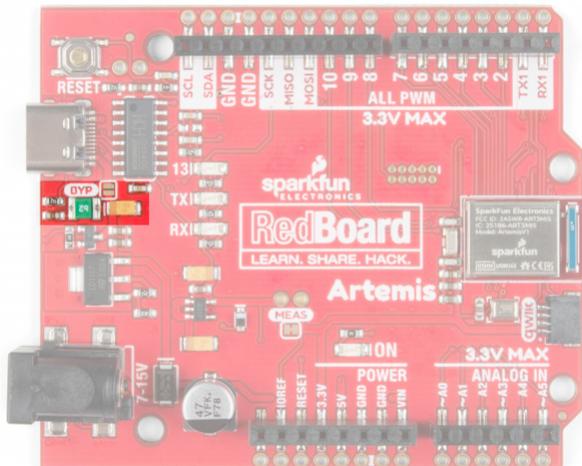
For the vast majority of projects a wall adapter or USB power can be used. But when properly isolated the Artemis can run on a coin cell battery for weeks! So we've designed in a 20mm SMD coin cell footprint so that users can experiment with powering the Artemis from a standard CR2032. You can pickup the compatible coin cell holder [here](#).



Bypass Jumper

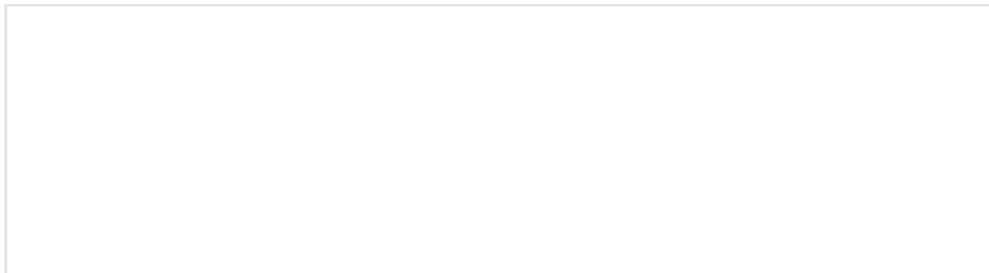
USB C is wonderful. It's reversible and can source up to 2 amps at 5 volts without any power delivery (PD) negotiation. We've included a 2A resettable fuse (often called a *PTC*) on the Artemis as a safety feature in case your project decides to consume inordinate amounts of power (And possibly begins to spark and set fire. That was fun wasn't it? Get it? SparkFun?). In the event the RedBoard begins to pull more than 2 amps from the USB source, the resettable fuse will automatically trigger and disconnect the board from the computer or power supply. This should protect your power source and the traces on your RedBoard.

However, there are plenty of legitimate projects that need more than 2A. We've designed the power traces to withstand up to 2A with a 10C rise in temperature. If your power supply can provide adequate power, and you know what you are doing, you can close the *BYP* jumper circumventing the resettable fuse.



Software Setup

The RedBoard Artemis runs both Arduino and the more advanced Ambiq HAL/SDK. Checkout these tutorials to get you up and blinking in 5 minutes!

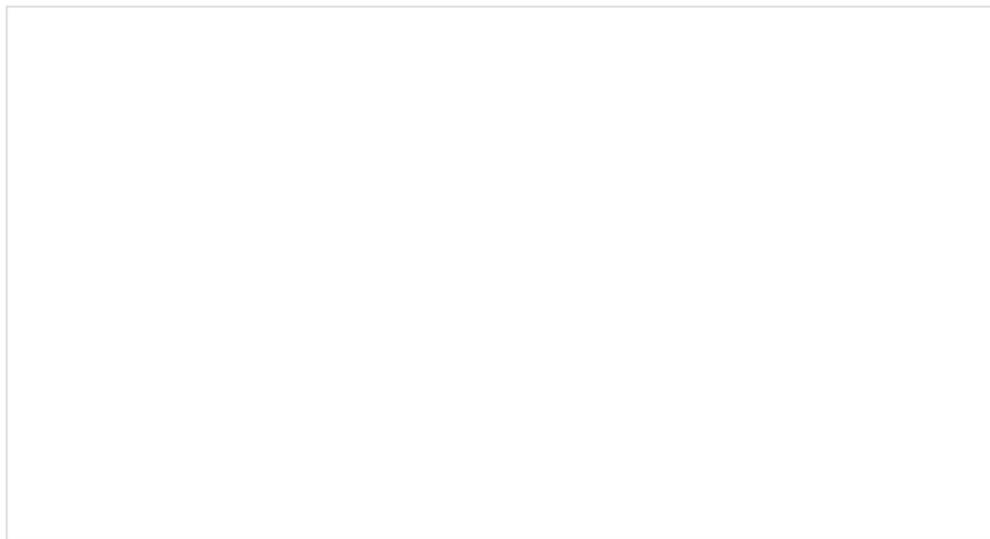




Artemis Development with Arduino

JUNE 20, 2019

Get our powerful Artemis based boards (Artemis Nano, BlackBoard Artemis, and BlackBoard Artemis ATP) blinking in less than 5 minutes using the SparkFun Artemis Arduino Core!



Using SparkFun Edge Board with Ambiq Apollo3 SDK

MARCH 28, 2019

We will demonstrate how to get started with your SparkFun Edge Board by setting up the toolchain on your computer, examining an example program, and using the serial uploader tool to flash the chip.

Troubleshooting

Need help?

If your product is not working as you expected or you need technical assistance or information, head on over to the SparkFun Technical Assistance page for some initial troubleshooting.

If you don't find what you need there, the SparkFun Forums are a great place to find and ask for help. If this is your first visit, you'll need to create a Forum Account to search product forums and post questions.

[SparkFun Artemis Forums](#)

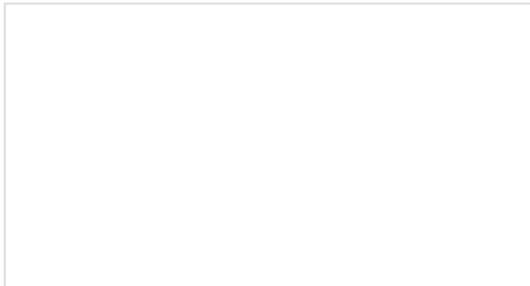
Resources and Going Further

Did you know you can use the RedBoard Artemis as the starting point of your very own Artemis product? Get the design files from our repo here and edit them using Eagle PCB!

For more information on the RedBoard Artemis and the Artemis module itself, check out the links below:

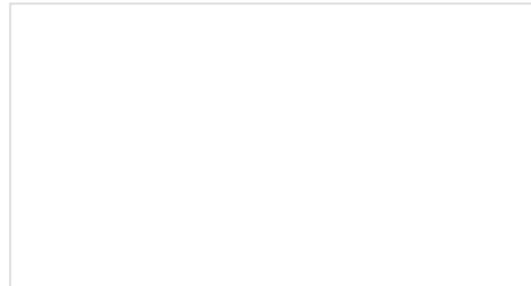
- Schematic (PDF)
- Eagle Files (ZIP)
- RedBoard Artemis Graphical DataSheet (PDF)
- Artemis Module Graphical DataSheet (PDF)
- Arduino Core
- Artemis Info Page
- GitHub Hardware Repo
- Apollo3 DataSheet (PDF)
- Ambiq
- CH340E USB to serial IC Drivers

You've now explored the board, let's get blinking with Arduino! Or perhaps you want to learn a little more about the Artemis module itself. Checkout these tutorials!



Designing with the SparkFun Artemis

Let's chat about layout and design considerations when using the Artemis module.



Artemis Development with Arduino

Get our powerful Artemis based boards (Artemis Nano, BlackBoard Artemis, and BlackBoard Artemis ATP) blinking in less than 5 minutes using the SparkFun Artemis Arduino Core!

Did you know the Artemis is compatible with our Qwiic line? Checkout these products that simply plug in and work!



SparkFun Transparent Graphical OLED Breakout (Qwiic)

● LCD-15173



SparkFun Environmental Sensor Breakout - BME680 (Qwiic)

● SEN-16466



SparkFun Artemis Development Kit with Camera
© KIT-17071

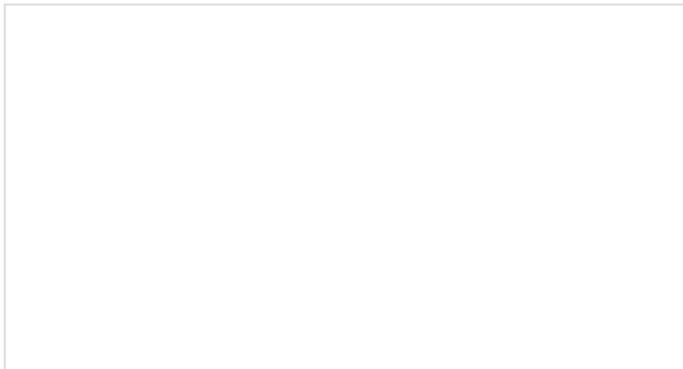


SparkFun QwiicBus - MidPoint
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Product Showcase: SparkFun RedBoard Artemis Qw...



Or check out this blog post for more ideas using the RedBoard Artemis.



Reflow Toaster Oven - a Qwiic Hack!
JUNE 25, 2020