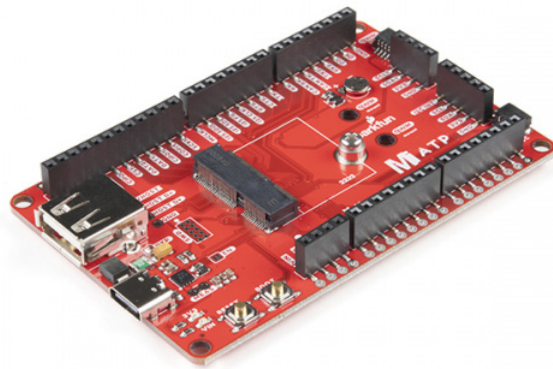


MicroMod All The Pins (ATP) Carrier Board

Introduction

Access All The Pins (i.e. ATP) of the MicroMod Processor Board with the MicroMod ATP Carrier Board!



SparkFun MicroMod ATP Carrier Board

● DEV-16885

Required Materials

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

MicroMod Processor Board

You'll need a Processor Board to break out the pins.



SparkFun MicroMod Artemis Processor

● DEV-16401



SparkFun MicroMod ESP32 Processor

● WRL-16781



SparkFun MicroMod SAMD51 Processor

● DEV-16791

Accessories

At a minimum, you will need a USB C cable to power and program the boards. Depending on your application, you may want to grab a Qwiic cable to connect a Qwiic-enabled device.



SparkFun Qwiic Cable Kit

● KIT-15081



USB 3.1 Cable A to C - 3 Foot

● CAB-14743

Tools

You will need a screw driver to tighten the screw between the processor board and carrier board.




SparkFun Mini Screwdriver

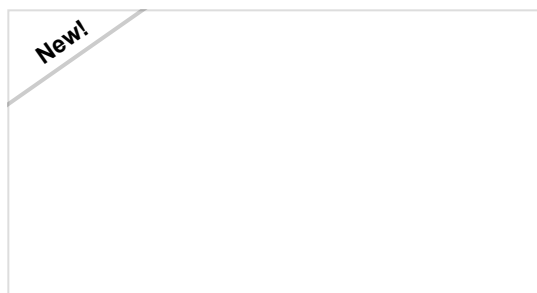
© TOL-09146

Suggested Reading

If you aren't familiar with the MicroMod ecosystem, we recommend reading here for an overview. We recommend reading here for an overview if you decide to take advantage of the Qwiic connector.

MicroMod	 QWIIC
<i>MicroMod Ecosystem</i>	<i>Qwiic Connect System</i>

If you aren't familiar with the following concepts, we also recommend checking out these tutorials before continuing.



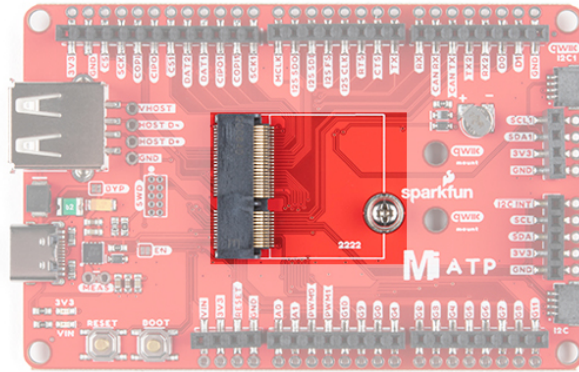
Getting Started with MicroMod

Dive into the world of MicroMod - a compact interface to connect a microcontroller to various peripherals via the M.2 Connector!

Hardware Overview

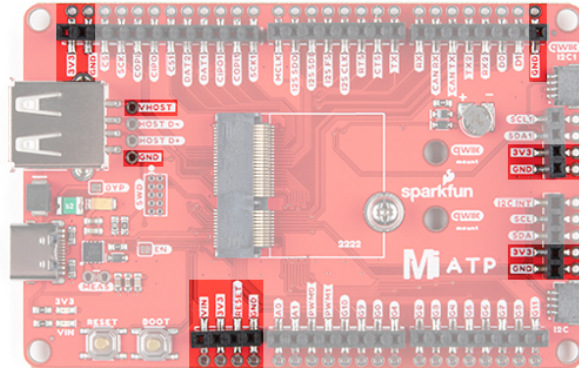
MicroMod Processor Board

The MicroMod ATP Carrier Board includes a location for a MicroMod Processor Board. Here is where your chosen Processor Board will reside.



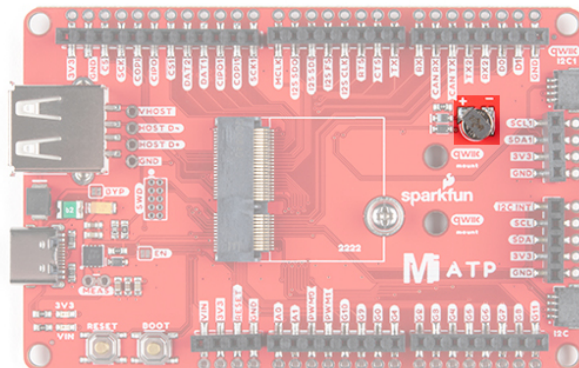
Power

There are a variety of power and power-related nets broken out to female header pins and their corresponding through hole pads. The image below highlights those female headers and pads. The board can be powered from the VIN pin with a recommended voltage between **3.3V to 6.0V**. It can also be powered with 5V from the USB C connector. The voltage is regulated down to **3.3V** with the AP7361C voltage regulator to power your devices with up to 1A of current. If your voltage is clean, and regulated, you can also connect it directly to the 3.3V line.



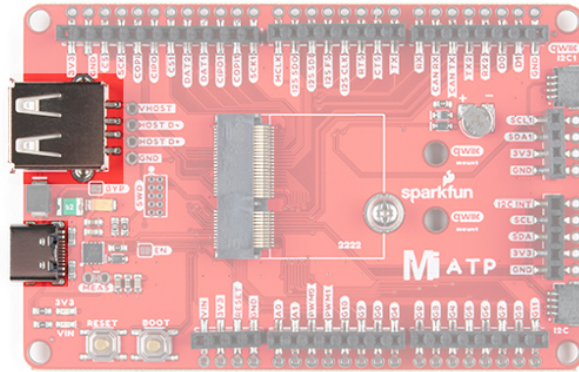
Backup Battery

The board has a built-in backup battery for Processor Boards with an RTC. Depending on the processor, it may not be connected



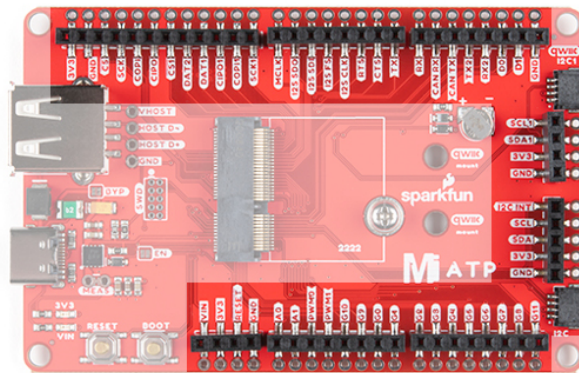
USB Ports

You have the option of connecting the board to a computer using the USB connectors. The USB Type C connector is used to power, program the processor board, or pass serial data to a serial port. If your processor board has the ability, there is also an option for USB host through the female USB Type A connector. There is a Schottky diode on the USB host's 5V pin but we do not recommend connecting two both the Type C and Type A ports.



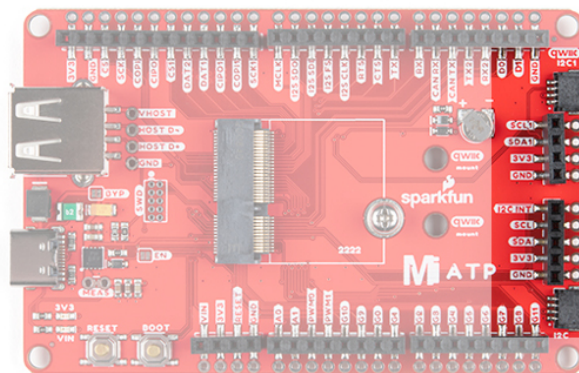
All the [GPIO] Pins

Remember our "All the Pins!" nickname? Well, we meant it. On the MicroMod ATP, not only have we broken out all the major pins with female headers, we've added a secondary rail of plated through-holes alongside them to give you the choice of either plug and play or soldering directly to the board. The general hardware pinout v1.0 is broken out on the edge of the board. Your mileage may vary depending on the processor board that you are using.



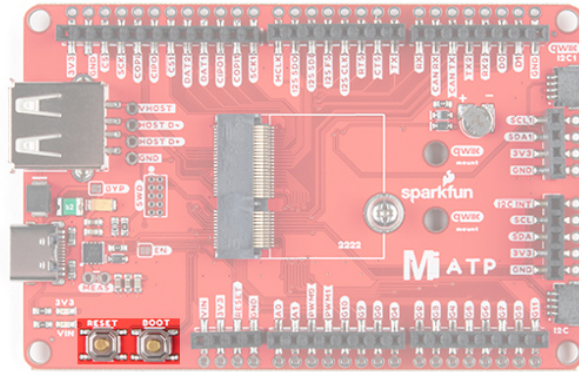
Qwiic and I²C

There are two locations on the board for your favorite Qwiic-enabled device. IN addition to the Qwiic conenctors, we also have pins that are broken out on the should you need to use jumper wires or solder wire direction to both boards. There are mounting holes for each standard 1.0"x1.0" Qwiic-enabled device.



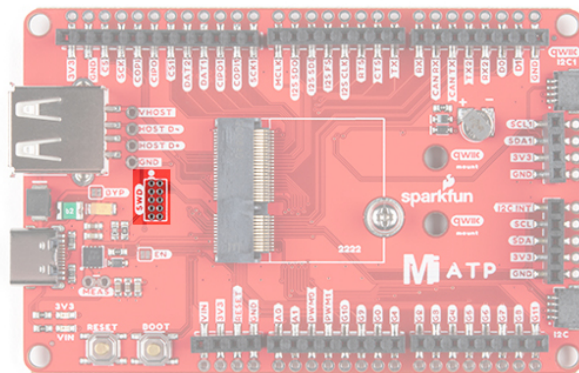
Reset and Boot Buttons

The reset button will reset the processor. The boot button will put the processor into a special boot mode. Depending on the processor board, this boot pin may not be connected.



SWD Programming Pins

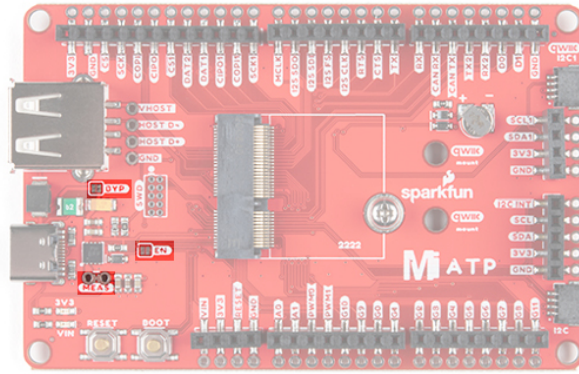
For advanced users, we broke out the SWD programming pins. Note that this is not populated so you will need a compatible header and compatible JTAG programmer to connect.



Jumper Pads

There are a few jumpers populated on the board:

- **Bypass (BYP)** - By default, the BYP is left open. Adding a solder jumper bypasses the 2A resettable fuse on the back of the board should you decide to pull more than 2A from your USB source. Proceed with caution should you decide to bypass the jumper.
- **Enable (EN)** - By default, the EN pin is closed. This jumper is connected to a processor board's GPIO pin. The processor board can control the ATP's voltage regulator. Depending on the processor, this may not be connected.
- **Current Measurement (MEAS)** - By default, the MEAs is closed. Cutting the jumper and soldering to the PTH pads will allow you to insert a current meter and precisely monitor the how much current your application is consuming.
- **3V3 LED** - By default, the 3V3 LED is closed. Cutting this jumper will disable the LED there is 3.3V.
- **VIN LED** - By default, the VIN LED is closed. Cutting this jumper will disable the LED whenever there is an input voltage.



General MicroMod Pinout

Wondering what the pins are that are broken out on the ATP MicroMod ATP Carrier Board? Check out the table from the Getting Started with MicroMod for more information. Remember to check out the pins against your Processor Board to determine what pins are available.

MICROMOD GENERAL PINOUT TABLE

MICROMOD GENERAL PIN DESCRIPTIONS

AUDIO	UART	GPIO/BUS	I ² C	SDIO	SPI0	Dedicated
		(Not Connected)	75		GND	
		3.3V	74	73	G5 / BUS5	
		RTC_3V_BATT	72	71	G6 / BUS6	
	SPI_CS1#	SDIO_DATA3 (I/O)	70	69	G7 / BUS7	
		SDIO_DATA2 (I/O)	68	67	G8	
		SDIO_DATA1 (I/O)	66	65	G9	ADC_D- CAM_HSYNC
	SPI_CIP01	SDIO_DATA0 (I/O)	64	63	G10	ADC_D+ CAM_VSYNC

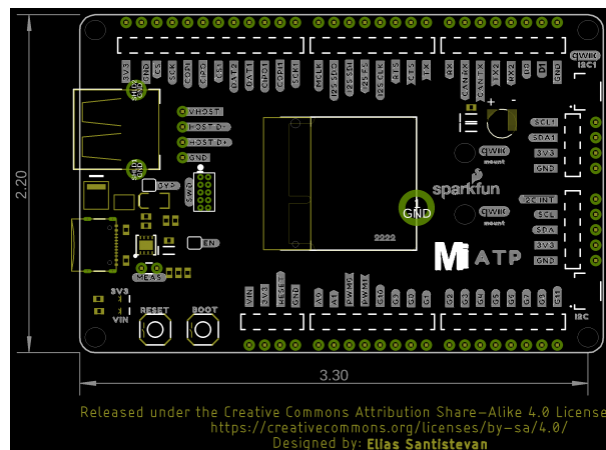
	SPI COPI1	SDIO_CMD (I/O)	62	61	SPI_CIPO		
	SPI SCK1	SDIO_SCK (O)	60	59	SPI_COPI (O)	LED_DAT	
		AUD_MCLK (O)	58	57	SPI_SCK (O)	LED_CLK	
PCM_OUT / CAM_MCLK	I2S_OUT	AUD_OUT	56	55	SPI_CS#		
PCM_IN / CAM_PCLK	I2S_IN	AUD_IN	54	53	I2C_SCL1 (I/O)		
PCM_SYNC / PDM_DATA	I2S_WS	AUD_LRCLK	52	51	I2C_SDA1 (I/O)		
PCM_CLK / PDM_CLK	I2S_SCK	AUD_BCLK	50	49	BATT_VIN / 3 (I - ADC) (0 / 3.3V)		
		G4 / BUS4	48	47	PWM1		
		G3 / BUS3	46	45	GND		
		G2 / BUS2	44	43	CAN_TX		
		G1 / BUS1	42	41	CAN_RX		
		G0 / BUS0	40	39	GND		
		A1	38	37	USBHOST_D-		
		GND	36	35	USBHOST_D+		
		A0	34	33	GND		
		PWM0	32	31	Module Key		
		Module Key	30	29	Module Key		
		Module Key	28	27	Module Key		
		Module Key	26	25	Module Key		
		Module Key	24	23	SWDIO		
		UART_TX2 (O)	22	21	SWDCK		
		UART_RX2 (I)	20	19	UART_RX1 (I)		

	CAM_TRIG	D1	18	17	UART_RX1 (0)		
		I2C_INT#	16	15	UART_CTS1 (I)		
		I2C_SCL (I/O)	14	13	UART_RTS1 (O)		
		I2C_SDA (I/O)	12	11	BOOT (I - Open Drain)		
		D0	10	9	USB_VIN		
	SWO	G11	8	7	GND		
		RESET# (I - Open Drain)	6	5	USB_D-		
		3.3V_EN	4	3	USB_D+		
		3.3V	2	1	GND		



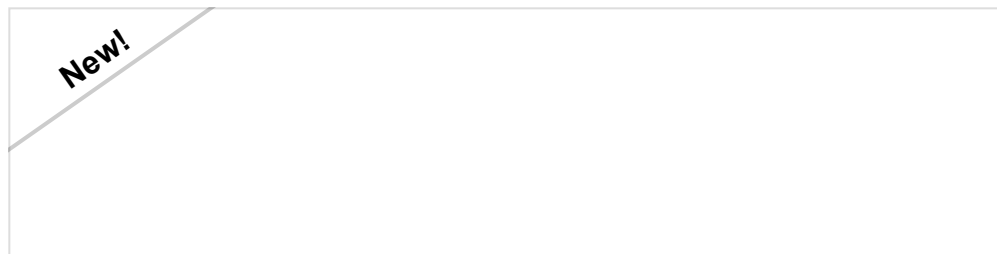
Board Dimensions

The board is 3.30"x2.20". There are 4x mounting holes on each corner of the board.



Hardware Hookup

If you have not already, make sure to check out the Getting Started with MicroMod: Hardware Hookup for information on inserting your Processor Board to your Carrier Board.

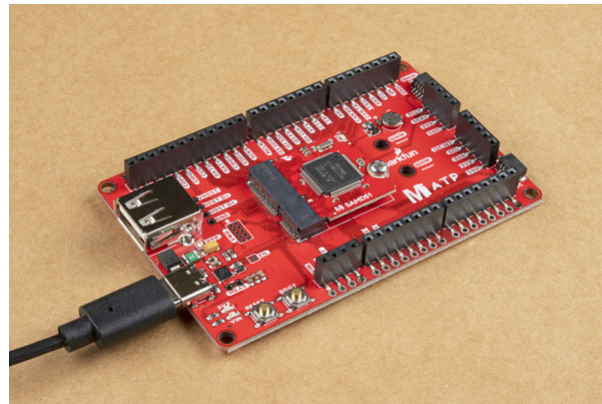


Getting Started with MicroMod

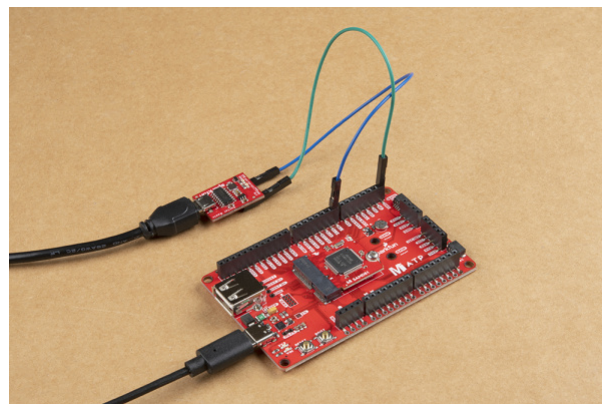
OCTOBER 21, 2020

Dive into the world of MicroMod - a compact interface to connect a microcontroller to various peripherals via the M.2 Connector!

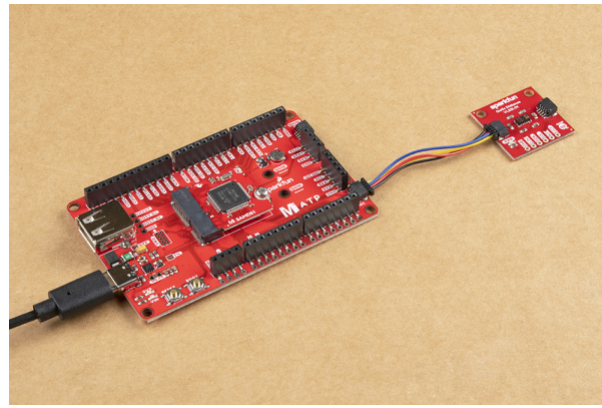
At a minimum, your setup should look like the image below. In this case, we had the MicroMod SAMD51 Processor Board secured in the M.2 connector. To program and power the microcontroller, we inserted the USB-C cable.



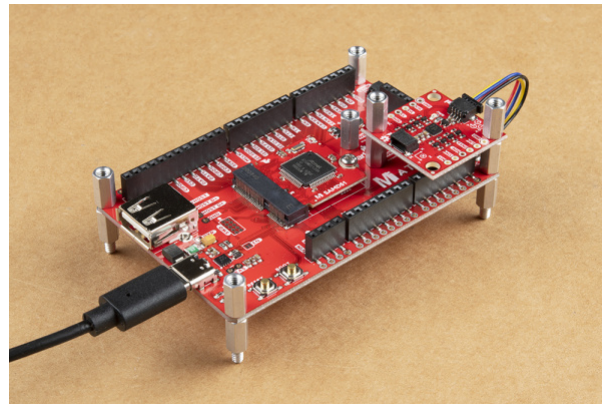
Depending on your setup you may need hardware (jumper wire, cables, header pins, breadboard, etc.) to connect to the board. In this case, we used jumper wire to connect to another board.



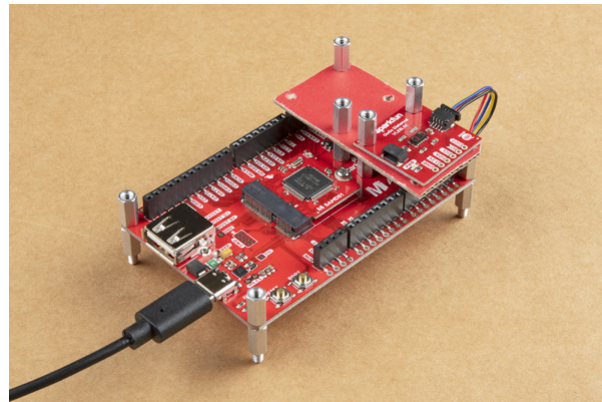
To Qwiic-ly connect ²C devices, simply insert a Qwiic cable between the MicroMod ATP's Qwiic port and your Qwiic device.



To secure the boards together, you could add standoffs and screws to mount a Qwiic-enabled device that have the standard 1.0"x1.0" sized board. Keep in mind that this will block a few of the header pins below so make sure to plan accordingly.



Depending on the location of the mounting holes, you may need to make an adapter to hold the Qwiic-enabled device securely. Below is an example with mounting holes on the same side instead of diagonal. A piece of cardboard was cut out as shown in the image below. Depending on your personal preference, you could also laser cut, CNC, or 3D printer to make a more sturdy panel for those that need a stronger material.



Example

Note: If this is your first time using Arduino IDE or board add-on, please review the following tutorials.

- Installing the Arduino IDE
- Installing Board Definitions in the Arduino IDE

There are quite a lot of peripherals broken out on the MicroMod ATP Carrier Board. Depending on the design of the Processor Board, not all of the pins may be broken out. For simplicity, we will upload a blink sketch to get started.

Blink

Note: Make sure that for whatever processor board you choose, you have the correct board definitions installed. Go to our MicroMod Processor Boards landing page, find your processor board, and head on over to that tutorial for help installing your board definition.

Now that you have a Processor Board secure in the Carrier Board, let's upload a simple blink sketch to the board. Copy and paste the following code in the Arduino IDE. Head to **Tools > Board** to select the correct board definition (in this case, **SparkFun MicroMod SAMD51**. Select the correct COM port that the board enumerated to. Hit upload.

```
/*
  Blink
  Turns on an LED on for one second, then off for one second, repeatedly.

  This example code is in the public domain.
*/

// Pin 13 has an LED connected on most Arduino boards.
// give it a name
// uncomment the following lines if the macro is not defined for your architecture
// #define LED_BUILTIN 13 //Artemis, SAMD51
// #define LED_BUILTIN 5 //ESP32

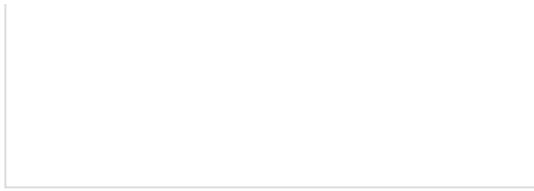
// the setup routine runs once when you press reset:
void setup() {
  // initialize the digital pin using the built-in macro as an output.
  pinMode(LED_BUILTIN, OUTPUT);
}

// the loop routine runs over and over again forever:
void loop() {
  digitalWrite(LED_BUILTIN, HIGH); // turn the LED on (HIGH is the voltage level)
  delay(1000); // wait for a second
  digitalWrite(LED_BUILTIN, LOW); // turn the LED off by making the voltage LOW
  delay(1000); // wait for a second
}
```

After uploading, you should see the Processor Board's LED blink. If not, make sure that to define the pin and check your connections.

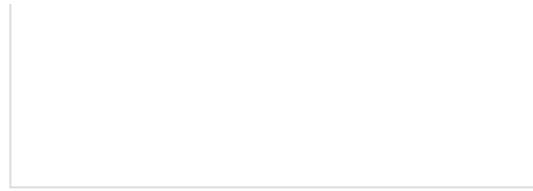
What's next? Try building a circuit using the design files and associated tutorial for your Processor Board more information. Keep in mind that while each Processor Board uses the same MicroMod interface pinout, each board may have different specifications, software support, and peripherals available for the architecture.





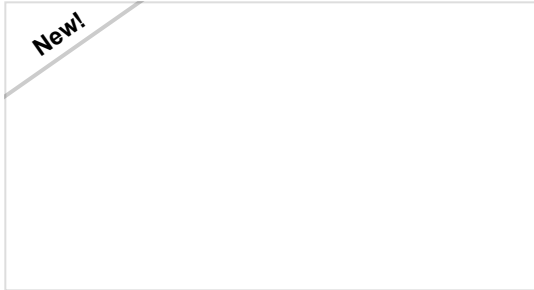
MicroMod Artemis Processor Board Hookup Guide

Get started with the Artemis MicroMod Processor Board in this tutorial!



MicroMod SAMD51 Processor Board Hookup Guide

This tutorial covers the basic functionality of the MicroMod SAMD51 and highlights the features of the ARM Cortex-M4F development board.



MicroMod ESP32 Processor Board Hookup Guide

A short Hookup Guide to get started with the SparkFun MicroMod ESP32 Processor Board

Troubleshooting

🔗 Not working as expected and need help?

If you need technical assistance and more information on a product that is not working as you expected, we recommend heading on over to the SparkFun Technical Assistance page for some initial troubleshooting.

[SPARKFUN TECHNICAL ASSISTANCE PAGE](#)

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.

[CREATE NEW FORUM ACCOUNT](#)

[LOG INTO SPARKFUN FORUMS](#)

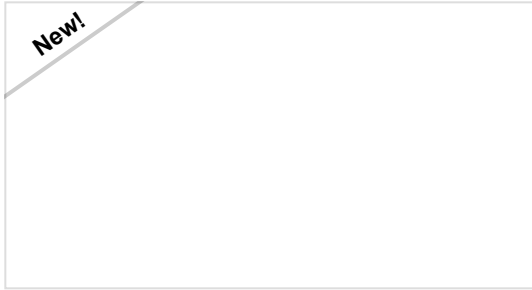
Resources and Going Further

Now that you've successfully got your MicroMod ATP Carrier Board up and running with your Processor Board, it's time to incorporate it into your own project! For more information, check out the resources below:

- Schematic (PDF)

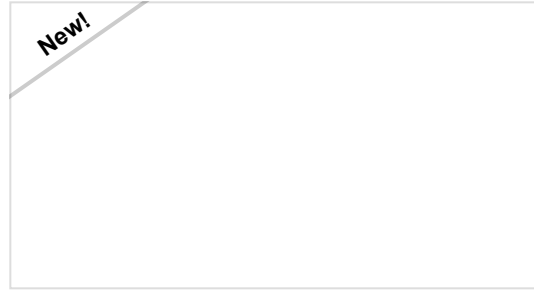
- Eagle Files (ZIP)
- Board Dimensions (PNG)
- GitHub Repo

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



MicroMod SAMD51 Processor Board Hookup Guide

This tutorial covers the basic functionality of the MicroMod SAMD51 and highlights the features of the ARM Cortex-M4F development board.



MicroMod ESP32 Processor Board Hookup Guide

A short Hookup Guide to get started with the SparkFun MicroMod ESP32 Processor Board



SparkFun MicroMod Input and Display Carrier Board Hookup Guide

A short Hookup Guide to get started with the SparkFun MicroMod Input and Display Carrier Board



MicroMod Data Logging Carrier Board Hookup Guide

Get started with some customizable MicroMod data logging with the Data Logging Carrier Board.