

MAKER UNO RP2040



Datasheet

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* Raspberry Pi is a trademark of the Raspberry Pi Foundation.

1. BOARD LAYOUT AND FUNCTION



Figure 1: MAKER-UNO-RP2040 Board Functions (TOP)

Function	Description					
LiPo / Li-Ion Battery	 JST-PH 2-pin connector for LiPo / Li-Ion battery. Connect to single cell LiPo / Li-Ion battery. The battery is rechargeable via USB. 					
Connector	* The battery is protected from overcharged and over discharged. If the board cannot be turned on when the battery is connected, please charge the battery to activate the battery protection circuit.					
On/Off Switch	• Slide switch used to turn on or off the power.					
Charging LED	 LED Indicator for the LiPo/Li-Ion battery charging status. Turns on when the battery is charging and off when the battery is full 					
USB Type-C	• Used for both powering and programming the board from a PC.					
Reset Button	 Button used to reset the RP2040. Press to restart the board without unplugging the USB cable or battery. 					
Boot Button	 Button used to enter bootloader mode. Press and hold this button while resetting the Maker Uno RP2040 to enter bootloader mode. This mode is used to load either the Micropython/Circuitpython firmware or custom C/C++ firmware onto 					

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				Datash	eet - MA	AKER-UN	NO-RP20
	the device."						
Function	Description						
User Programmable Button	 Accessible fr Internally co 	om the nnected	user progra l to GP2.	ım.			
	4-pin, 2.0mnPins connect	n pitch, ion;	Grove conn	iector fo	or exterr	nal grove	modules
	Grove Port	GPIO	PWM	SPI	I2C	UART	Analog
	1	0	PWM0-A	SDI0	SDA0	TX0	-
	1	1	PWM0-B	CSn0	SCL0	RX0	-
	2	4	PWM2-A	SDI0	SDA0	TX1	-
		5	PWM2-B	CSn0	SCL0	RX1	-
Grove Ports	3	6	PWM3-A	SCK0	SDA1	-	-
		26	PWM5-A	SCK1	SDA1	-	ADC0
	4	7	PWM3-B	SD00	SCL1	-	-
	1	27	PWM5-B	SD01	SCL1	-	ADC1
	5	28	PWM6-A	SDI1	SDA0	TX0	ADC2
		29	PWM6-B	CSn1	SCL0	RX0	ADC3
	6	20	PWM2-A	SDI0	SDA0	TX1	
		21	PWM2-B	CSn0	SCL0	RX1	
Maker Port	 JST-SH 4-pin Connector for external modules or sensors. Compatible with QWIIC / Stemma QT / Grove (with conversion cable). * The pins are shared with the Grove 6 port (GPIO 20, 21). 						
Pin Header	• Female conn	ector fo	r external c	onnecti	on.		
Servo Ports	 Connectors f Signal (S) is 	or 4 x R interna	C servo mo lly connect	tors. ed to Gl	P14, GP	15, GP16	and GP

Servo Ports	 Signal (S) is internally connected to GP14, GP15, GP16 and GP17 respectively. Servo Voltage is equal to the power source voltage.
SPI Port	• Male header for SPI communication.
RGB LEDs (WS2812)	 User programmable WS2812B RGB LED. Internally connected to GP25.
GPIO Status LEDs	 LED indicators for RP2040 GPIOs that are connected to the socket header. Turns on when the GPIO state is high.
Power LEDs	 LED indicator for 3.3V and 5V. Turn on when powered up.
Buzzer Mute Switch	 Slide switch used to mute the piezo buzzer (placed at the bottom layer of the PCB). Suggested to use if GP8 is used for other purposes.



Table 1: MAKER-UNO-RP2040 Board Functions

Figure 2: MAKER-UNO-RP2040 Board Functions (Bottom)

Function	Description				
Raspberry Pi RP2040	 Microcontroller for the Maker Uno RP2040 board. Low-cost, high-performance microcontroller equipped with a dual- core ARM Cortex-M0+ processor, ample memory, and versatile I/O options. 				
Piezo Buzzer	 Programmable piezo buzzer, can be used to play tone or melody. Internally connected to GP8. 				
Digital IO LEDs Disable Solder Jumper	 Default closed solder jumper that connects 3.3V with IOs LED power trace. Cut (open) the connecting trace to disable the digital IO LEDs. This action can help to conserve power or reduce distraction from the IO LEDs. 				

Table 2: MAKER-UNO-RP2040 Board Functions (Bottom)

2. PWM ON RP2040

The RP2040 PWM block is composed of 8 slices (PWM0, PWM1, PWM2...), each having the capability to drive two PWM output signals, A and B resulting in a total of up to 16 controllable PWM outputs. Each GPIO pin is assigned with a PWM slice and output, which is also referred to as a channel. Therefore, all RP2040 GPIO pins support PWM. However, if the GPIO pins share the same PWM channel, simultaneous PWM usage is not possible.

Note that for the Maker Uno RP2040 not all GPIO pins of the RP2040 are broken out and connected, the table below highlights potential channel conflicts that may occur. Please refer to the pinout diagram in the next section for detailed information about each pin's PWM channel.

PWM Channel	GPIO		
	0		
PWM0-A	16 (Servo 3)		
	1		
PWM0-B	17 (Servo 4)		
	4		
PWM2-A	20		
	5		
P VV IVIZ-A	21		

Table 3: Shared PWM channel for connected GPIO pins.

3. SPECIFICATION

No	Parameters	Min	Max	Unit	
1	Power Input Voltage (USB or LiPo/Li-Ion)	ltage (USB or LiPo/Li-Ion)			
		Low Level	-0.3	0.8	v
2	Digital Input Voltage	High Level	2.0	3.6	v
		Low Level	0	0.5	v
3	Digital Output Voltage	2.62	3.3	v	
4	Analog Input Voltage		0	3.3	v
5	Total +3V3 Output Current	-	500	mA	
6	Total +5V Output Current	-	600	mA	
7	Vservo (Only USB is connected)	VUSE	3 - 0.4	v	
8	Vservo (Only LiPo/Li-Ion is connected)	*VI	ВАТ	v	
9	Vservo (USB and LiPo/Li-Ion are connected)		VUSE	3 - 0.4	v
10	Operating Temperature	-20	85	°C	
11	USB VID & PID	VID	0x2	E8A	
	(CircuitPython & Arduino Core)	PID	0x1071		с

Table 4: MAKER-UNO-RP2040 Absolute Maximum Ratings

*VBAT is the voltage of the LiPo/Li-Ion battery.

4. DIMENSION



Figure 4: MAKER-UNO-RP2040 Dimension

5. SETTING UP FOR ARDUINO IDE, CIRCUITPYTHON OR

MICROPYTHON

In this guide, we will walk you through setting up your Maker Uno RP2040 for three different programming platform; CircuitPython, Arduino IDE and MicroPython. We'll then test each setup with a simple blink code to ensure everything is working correctly.

Prerequisites:

- Maker Uno RP2040
- USB-C cable
- Computer with a USB port
- Corresponding IDEs/coding softwares for each coding platform.

ARDUINO IDE

For this guide, it is written based on Arduino IDE version 2.

Before starting programming the board you will need to add the Maker Uno RP2040 to the Arduino Boards Manager.

 Open the Arduino IDE and navigate to the following directory: File > Preferences > Settings.



 Scroll to the bottom of the window pane and locate the "Additional Boards Manager URLs" box and paste this following URL: <u>https://github.com/earlephilhower/arduino-pico/releases/download/global/package rp2040 index.json</u>. Click "OK" to close the window.

Show files inside Sketches		
Editor font size:	14	
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Language:	English (Reload required)	
Show verbose output during	🗌 compile 🗌 upload	
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Editor Quick Suggestions		
Additional boards manager UR	Ls. https://giurub.com/eanephinower/arounto-pico/releases/download/global/pack	4
		1

Note: If you already have URLs for other boards, you can separate them with commas like this:

https://github.com/earlephilhower/arduino- pico/releases/download/global/package_rp2040_index.json,
nttps://raw.gitnubusercontent.com/espressif/arduino-esp32/gn-pages/package_esp32_index.json

3. Open the Boards Manager by clicking the board manager icon or navigating to Tools > Board > Boards Manager. Search for the word "uno rp2040," and the Raspberry Pi Pico/RP2040 by Earle F. Philhower board package should appear, as shown in the picture below. Click "Install" to install the board package.

File Edi	t Sketch Tools Help		
	Arduino Uno 🗸		
		Blink.ino	Dy ALCOLO GUADATO
Ð	Type: All	17 18	modified 8 Sep 201 by Colby Newman
0	Raspberry Pi Pico/RP2040 by Earle F. Philhower, III	20	This example code
	Boards included in this package: Raspberry Pi Pico, Raspberry Pi Pico W, 0xCB Helios, Adafruit Feather RP2040, Adafruit Feather RP3040 SCORPIO, Adafruit Feather RP3040 DVI	22 23	https://www.arduir */
0	More info	24 25	<pre>// the setup function // the setup function // function</pre>
Q	3.7.2 VINSTALL 3	26	<pre>void setup() { // initialize digi ninMode(LED_BUILT)</pre>
		29	}

4. After installation completed. Select Maker Uno RP2040 board from Tools > Board>Raspberry Pi Pico/RP2040> Cytron Maker Uno RP2040.



5. Next, to upload code to the Maker Uno RP2040 for the first time, you need to ensure it is in bootloader mode. For that, firstly connect the board to your computer using a USB-C cable and turn on the board.



6. Press and hold the "BOOT" button and then press the "RESET" button. Make sure you release the "RESET" button first before releasing the "BOOT" button.



7. Select the corresponding COM port by selecting Tools>Port. Now we are all set to program and upload the code to the Maker Uno RP2040 board!

Usually, the COM port will initially appear as "UF2_Board". After the upload is successful, the board will reset, and the COM port will then reappear as its corresponding port.



Note: You might need to recheck and reselect the COM port for the next sketch/code upload.

8. Now let's try uploading a simple sketch. Copy the code below into the Arduino IDE. Verify and upload the sketch by clicking by clicking the "Upload" icon in the Arduino IDE

```
//Turn an LED on for one second, then off for one second, repeatedly.
void setup() {
    // initialize digital pin LED_BUILTIN as an output.
    pinMode(1, OUTPUT);
}
// the loop function runs over and over again forever
```

void loop() {	
<pre>digitalWrite(1, HIGH);</pre>	// turn the LED on (HIGH is the voltage level)
delay(1000);	// wait for a second
<pre>digitalWrite(1, LOW);</pre>	// turn the LED off by making the voltage LOW
delay(1000);	// wait for a second
}	•••

9. If the code is successfully uploaded to the board, an output message as shown in the figure below should appear, and the onboard LED1 should be blinking every one second.

Output	∃ ≈ 6
Sketch uses 52260 bytes (2%) of program storage space. Maximum is 2093056 bytes. Global variables use 10232 bytes (3%) of dynamic memory, leaving 251912 bytes for local variables. Maximum is 20 Converting to uf2, output size: 140288, start address: 0x2000 Scanning for RP2040 devices Flashing D: (RPI-RP2) Wrote 140288 bytes to D:/NEW.UF2	62144 bytes
Ln 1 Col 1 Cvtron Maker UNO RP2040 on UF2 Board Inot connected	1 🗘 3 🗖

CIRCUITPYTHON

There are many software options you can use to program CircuitPython and MicroPython, even simple text editors like Notepad will do the work. For this guide, Thonny IDE is chosen as the coding software. Please download the IDE from the following link: <u>https://thonny.org/</u>

1. Connect the board to your laptop, power up the board and then enter bootloader mode by pressing and holding the "BOOT" button, followed by pressing the "RESET" button.



Make sure you switch on the board first before start flashing your code

Continue to hold the "BOOT" button until the RPI-RP2 drive as shown in the figure below appeared



- 2. The next step is to flash the CircuitPython firmware onto the board. There are two ways it can be done;
 - a. Paste the CircuitPython .uf2 file to the Raspberry Pi Drive
 - i. Download the latest <u>CircuitPython firmware</u> for the Maker Uno RP2040 board from the <u>CircuitPython</u> website.

С	https://circuitpyth	on.org/board/cytron_									£≞ @=
				Contributing	News	Awesome	Newsletter	Documentation		Discord	RSS
	python	Downloads	Libraries	Blinka					(Get Starte	d
	Maker Uno	RP2040									
				A THE REAL PROPERTY OF		CircuitP This is the I Uno RP204 Alpha deve have bugs Candidate assuming n Please try a helps us un Release No ENGLISH (Built-in mod addircle, bitops, boa	ython 9.0.0- atest developme io. Hopment release and the features and unfinished f (rc) release is co to further Issues i alpha, beta, and r (rc) release is co to further Issues i lipha, beta, and r (rc) release is co to the set of the set us) dules available: audomixer, audi rd, builtins, built	-beta.2 ent release of CircuitP ent release of CircuitP ent release of CircuitP ent releases if you are found. cr creleases if you are found. cr creleases if you are sues quickly. a.2 a.2 a.3 a.3 a.3 a.4 a.4 a.5 a.5 a.6 a.7 a.7 a.8 a.9 <p< td=""><td>Python that wi They are unfi nange. Beta ru e suitable for us suitable for ill become th able. Your tes DOWNLOAL elmap, adafru gio, array, at junsacil, bitba busio, busio.</td><td>II work with the M nished, are likely leases may have many uses. A R e next stable rele titing is invaluable titing is invaluable D. UF2 NOW</td><td>flaker to Please Hase, E It</td></p<>	Python that wi They are unfi nange. Beta ru e suitable for us suitable for ill become th able. Your tes DOWNLOAL elmap, adafru gio, array, at junsacil, bitba busio, busio.	II work with the M nished, are likely leases may have many uses. A R e next stable rele titing is invaluable titing is invaluable D. UF2 NOW	flaker to Please Hase, E It

ii. Drag the adafruit_circuitpython_etc.uf2 file you have downloaded to the RPI-RP2 drive.

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The RPI-RP2 drive will disappear and a new disk drive called CIRCUITPY will appear.

	* +		
\leftarrow \rightarrow \uparrow	C 🖵 > This PC >	Search This PC	۹
	(기 🗋 🖄 🖄 🛍 🛝 Sort ~	8= View ~ •••	Details
🔀 Pictures 🛛 🖈	imes Devices and drives		
🕗 Music 🔹 🖈	Acer (C:)		
📔 Videos 🛛 🖈	343 GB free of 475 GB		
	CIRCUITPY (D:)		
> 💻 This PC	0.97 MB free of 0.98 MB		
 CIRCUITPY (D:) 			
🗖 lib			
		This PC (2 items)	
2 items		e	

b. Paste the CircuitPython .uf2 file to the Raspberry Pi Drive

i. Open the Thonny IDE, look at the bottom right corner of the window, select 'Install CircuitPython...'.



ii. Select the correct target volume and CircuitPython family as shown in the figure below. Then, choose the variant as "Cytron Technologies • Maker Uno RP2040"

Install or update Ci	rcuitPython (UF2)	×
Here you can install ((this includes most b	or update CircuitPython for devices having an UF2 bootlo oards meant for beginners).	ader
1. Put your device int	o bootloader mode:	
- some devices ha	we to be plugged in while holding the BOOTSEL button.	
- some require do	puble-tapping the RESET button with proper rythm.	
2. Wait for couple of	seconds until the target volume appears.	
3. Select desired vari	ant and version.	
4. Click 'Install' and w	ait for some seconds until done.	
5. Close the dialog a	nd start programming!	
Target volume	RDLRD2 (D-)	~
rarget volume	NT N 2 (0.)	
family	RP2	
CircuitPython family	RP2	
variant		
	Boardsource - Blok	
version	Breadstick Innovations • Raspherry Breadstick	
info	Cvtron Technologies • EDU PICO for Pico W	
	Cytron Technologies • Maker Nano RP2040	
	Cytron Technologies • Maker Pi RP2040	
	Cytron Technologies • Maker Uno RP2040	
	DatanoiseTV • PicoADK - Audio Development Kit	
	ELECFREAKS • Pico:ed	
	Electrolama • minik Octave	
	Hack Club • Sprig	

iii. Click Install. You should get the output 'Done!' and a new disk drive called CIRCUITPY will appear.

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Target volume family CircuitPython family variant version info Done!	RPI-RP2 (D:) ~ RP2 ~ Cytron Technologies • Maker Uno RP2040 ~ 9.0.0-beta.2 ~ https://circuitpython.org/board/cytron maker uno rp2040/ Install Close	
⊕ New ~ 🔏 🗘 🗂 🖾		Details
 Pictures Devices and drives Music Videos This PC CIRCUITPY (D:) fseventsd 	ee of 475 GB ((D:) ree of 0.98 MB	
🖿 lib	This PC (2 if	tems)

3. Now let's try a simple code to verify that everything is working correctly. At the bottom right corner of the window make sure the correct Configure Interferer, **CircuitPython** (generic) and COM are shown and chosen.



4. Copy this code below and Click the Run icon to run the code.

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import board import digitalio import time led = digitalio.DigitalInOut(board.GP1) led.direction = digitalio.Direction.OUTPUT while True: led.value = True time.sleep(0.5) led.value = False time.sleep(0.5)

Thonny - D:\code.py @ 2 : 1 File Edit View Run Tools Help Piles *
Code.py Code.py Code.py Code.py Code.py

5. The onboard LED 1 should be blinking by 0.5 second. To stop the execution of the program, click the STOP button or simply press CTRL+C.

 Thonny - D:\code.py @ 2:1

 File
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