

## Description

The Arduino® UNO R4 WiFi is the first UNO board to feature a 32-bit microcontroller and an ESP32-S3 Wi-Fi® module (ESP32-S3-MINI-1-N8). It features a RA4M1 series microcontroller from Renesas (R7FA4M1AB3CFM#AA0), based on a 48 MHz Arm® Cortex®-M4 microprocessor. The UNO R4 WiFi's memory is larger than its predecessors, with 256 kB flash, 32 kB SRAM and 8 kB of EEPROM.

The RA4M1's operating voltage is fixed at 5 V, whereas the ESP32-S3 module is 3.3 V. Communication between these two MCUs is performed via a logic-level translator (TXB0108DQSR).

## Target areas:

Maker, beginner, education

## Features

The **R7FA4M1AB3CFM#AA0**, often referred to as RA4M1 in this datasheet, is the main MCU on the UNO R4 WiFi, connected to all pin headers on the board as well as all communication buses.

- **Overview**
  - 48 MHz Arm® Cortex®-M4 microprocessor with a floating point unit (FPU)
  - 5 V operating voltage
  - Real-time Clock (RTC)
  - Memory Protection Unit (MPU)
  - Digital-to-analog Converter (DAC)
- **Memory**
  - 256 kB Flash Memory
  - 32 kB SRAM
  - 8 kB Data Memory (EEPROM)
- **Peripherals**
  - Capacitive Touch Sensing Unit (CTSU)
  - USB 2.0 Full-Speed Module (USBFS)
  - 14-bit ADC
  - Up to 12-bit DAC
  - Operational Amplifier (OPAMP)
- **Power**
  - Operating voltage for RA4M1 is 5 V
  - Recommended input voltage (VIN) is 6-24 V
  - Barrel jack connected to VIN pin (6-24 V)
  - Power via USB-C® at 5 V
- **Communication**
  - 1x UART (pin D0, D1)
  - 1x SPI (pin D10-D13, ICSP header)
  - 1x I2C (pin A4, A5, SDA, SCL)
  - 1x CAN (pin D4, D5, external transceiver is required)

See the full datasheet for the R7FA4M1AB3CFM#AA0 in the link below:

- [R7FA4M1AB3CFM#AA0 datasheet](#)

The **ESP32-S3-MINI-1-N8** is the secondary MCU with a built-in antenna for Wi-Fi® & Bluetooth® connectivity. This module operates on 3.3 V and communicates with the RA4M1 using a logic-level translator (TXB0108DQSR).

- **Overview**
  - Xtensa® dual-core 32-bit LX7 microprocessor
  - 3.3 V operating voltage
  - 40 MHz crystal oscillator



- **Wi-Fi®**
  - Wi-Fi® support with 802.11 b/g/n standard (Wi-Fi® 4)
  - Bit rate at up to 150 Mbps
  - 2.4 GHz band
- **Bluetooth®**
  - Bluetooth® 5

See the full datasheet for the ESP32-S3-MINI-1-N8 in the link below:

- [ESP32-S3-MINI-1-N8 datasheet](#)



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**42** 0000

**43** 0000

**44** 0000

**45**



# 1 The Board

## 1.1 Application Examples

The UNO R4 WiFi is part of the first UNO series of 32-bit development boards, being previously based on 8-bit AVR microcontrollers. There are thousands of guides, tutorials and books written about the UNO board, where the UNO R4 WiFi continues its legacy.

The board features 14 digital I/O ports, 6 analog channels, dedicated pins for I2C, SPI and UART connections. It has a significantly larger memory: 8 times more flash memory (256 kB) and 16 times more SRAM (32 kB). With a 48 MHz clock speed, it is also 3x faster than its predecessors.

In addition, it features an ESP32-S3 module for Wi-Fi® & Bluetooth® connectivity, as well as a built-in 12x8 LED matrix, making it one of the most visually unique Arduino boards to date. The LED matrix is fully programmable, where you can load anything from still frames to custom animations.

**Entry-level projects:** If this is your first project within coding and electronics, the UNO R4 WiFi is a good fit. It is easy to get started with, and it has a lot of online documentation.

**Easy IoT applications:** build projects without writing any networking code in the Arduino Cloud. Monitor your board, connect it with other boards and services, and develop cool IoT projects.

**LED Matrix:** the 12x8 LED matrix on the board can be used for showing animations, text scrolling, create mini-games and much more, being the perfect feature to give your project more personality.

## 1.2 Related Products

- UNO R3
- UNO R3 SMD
- UNO R4 Minima

# Rating

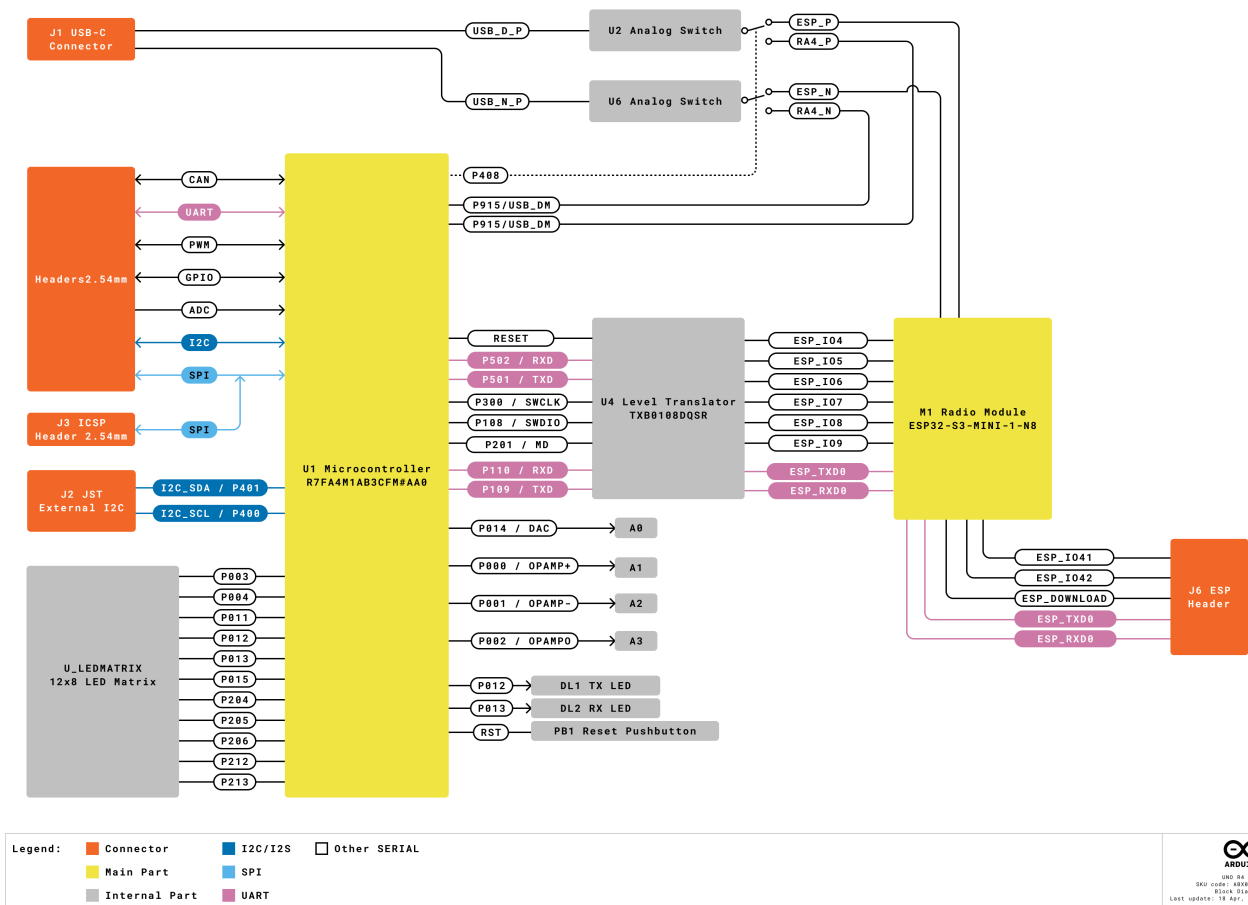
## 2 Recommended Operating Conditions

Symbol	Description	Min	Typ	Max	Unit
$V_{IN}$	Input voltage from VIN pad / DC Jack	6	7.0	24	V
$V_{USB}$	Input voltage from USB connector	4.8	5.0	5.5	V
$T_{OP}$	Operating Temperature	-40	25	85	°C

**Note:**  $V_{DD}$  controls the logic level and is connected to the 5V power rail.  $V_{AREF}$  is for the analog logic.

# Functional Overview

## 3 Block Diagram

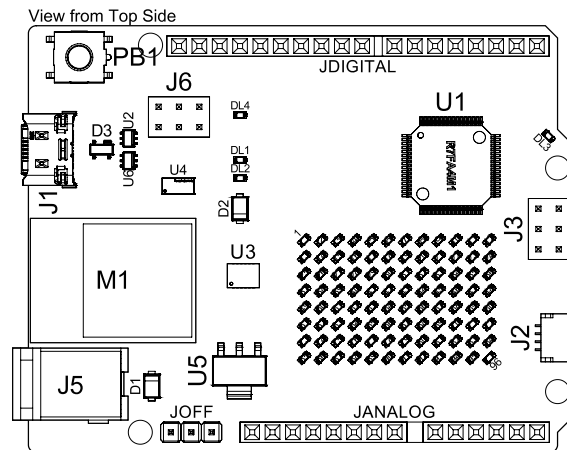


Arduino R4 WiFi Block Diagram



## 4 Board Topology

### 4.1 Front View



Top View of Arduino UNO R4 WiFi

Ref.	Description
U1	R7FA4M1AB3CFM#AA0 Microcontroller IC
U2	NLASB3157DFT2G Multiplexer
U3	ISL854102FRZ-T Buck Converter
U4	TXB0108DQSR logic level translator (5 V - 3.3 V)
U5	SGM2205-3.3XKC3G/TR 3.3 V linear regulator
U6	NLASB3157DFT2G Multiplexer
U_LEDMATRIX	12x8 LED Red Matrix
M1	ESP32-S3-MINI-1-N8
PB1	RESET Button
JANALOG	Analog input/output headers
JDIGITAL	Digital input/output headers
JOFF	OFF, VRTC header
J1	CX90B-16P USB-C® connector
J2	SM04B-SRSS-TB(LF)(SN) I2C connector
J3	ICSP header (SPI)
J5	DC Jack
J6	ESP header
DL1	LED TX (serial transmit)

Ref.	Description
DL2	LED RX (serial receive)
DL3	LED Power (green)
DL4	LED SCK (serial clock)
D1	PMEG6020AELRX Schottky Diode
D2	PMEG6020AELRX Schottky Diode
D3	PRTR5V0U2X,215 ESD Protection

## 5 Microcontroller (R7FA4M1AB3CFM#AA0)

The UNO R4 WiFi is based on the 32-bit RA4M1 series microcontroller, **R7FA4M1AB3CFM#AA0**, from Renesas, which uses a 48 MHz Arm® Cortex®-M4 microprocessor with a floating point unit (FPU).

The operating voltage for the RA4M1 is fixed at 5 V as to be hardware compatible with shields, accessories & circuits based on previous Arduino UNO boards.

The R7FA4M1AB3CFM#AA0 features:

- 256 kB flash / 32 kB SRAM / 8 kB data flash (EEPROM)
- Real-time Clock (RTC)
- 4x Direct Memory Access Controller (DMAC)
- 14-bit ADC
- Up to 12-bit DAC
- OPAMP
- CAN bus

For more technical details on this microcontroller, visit the Renesas - RA4M1 series official documentation.

## 6 Wi-Fi® / Bluetooth® Module (ESP32-S3-MINI-1-N8)

The Wi-Fi® / Bluetooth® LE module on the UNO R4 WiFi is from the ESP32-S3 SoCs. It features the Xtensa® dual-core 32-bit LX7 MCU, a built-in antenna and support for 2.4 GHz bands.

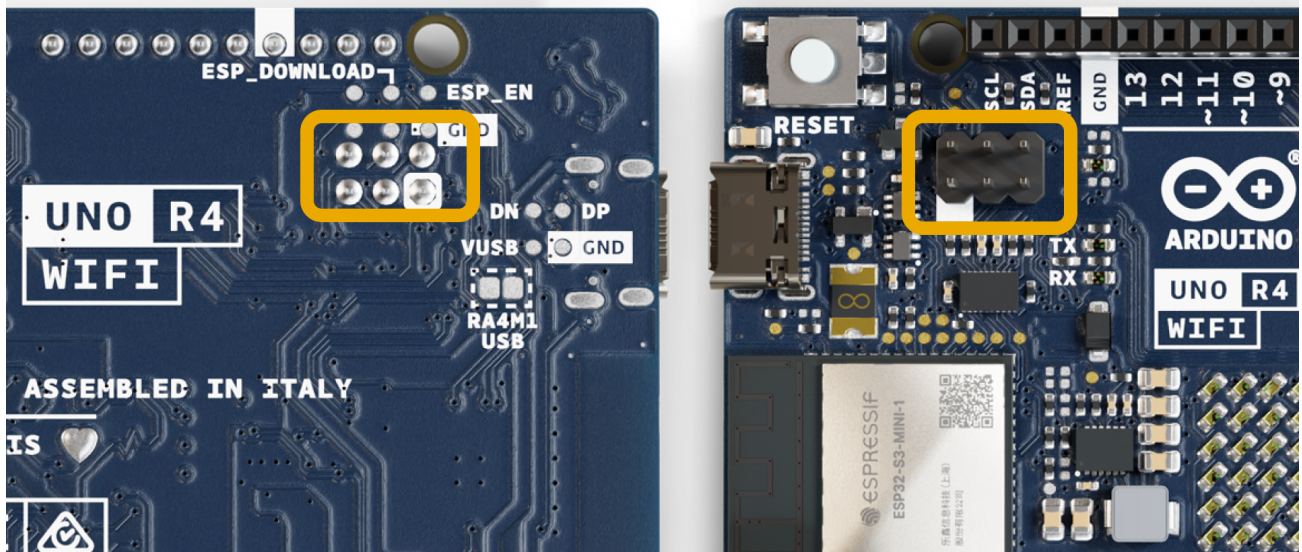
The ESP32-S3-MINI-1-N8 features:

- Wi-Fi® 4 - 2.4 GHz band
- Bluetooth® 5 LE support
- 3.3 V operating voltage
- 384 kB ROM
- 512 kB SRAM
- Up to 150 Mbps bit rate

This module acts as a secondary MCU on the UNO R4 WiFi, and communicates with the RA4M1 MCU using a logic-level translator. Note that this module operates on 3.3 V as opposed to the RA4M1's 5 V operating voltage.

## 6.1 ESP Header

### ESP HEADER

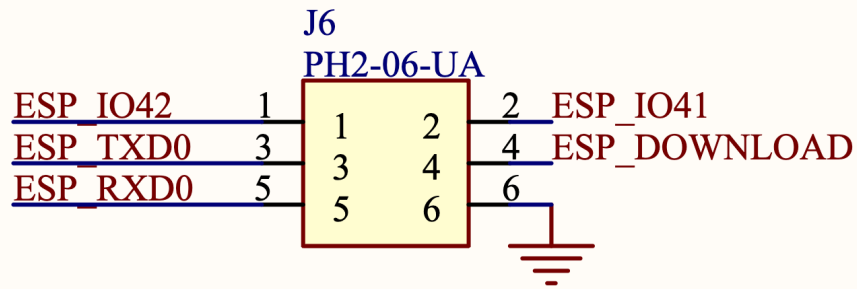


ESP header.

The header located close to the RESET button can be used to access the ESP32-S3 module directly. The pins accessible are:

- ESP\_I042 - MTMS debugging (Pin 1)
- ESP\_I041 - MTDI debugging (Pin 2)
- ESP\_TXD0 - Serial Transmit (UART) (Pin 3)
- ESP\_DOWNLOAD - boot (Pin 4)
- ESP\_RXD0 - Serial Receive (UART) (Pin 5)
- GND - ground (Pin 6)

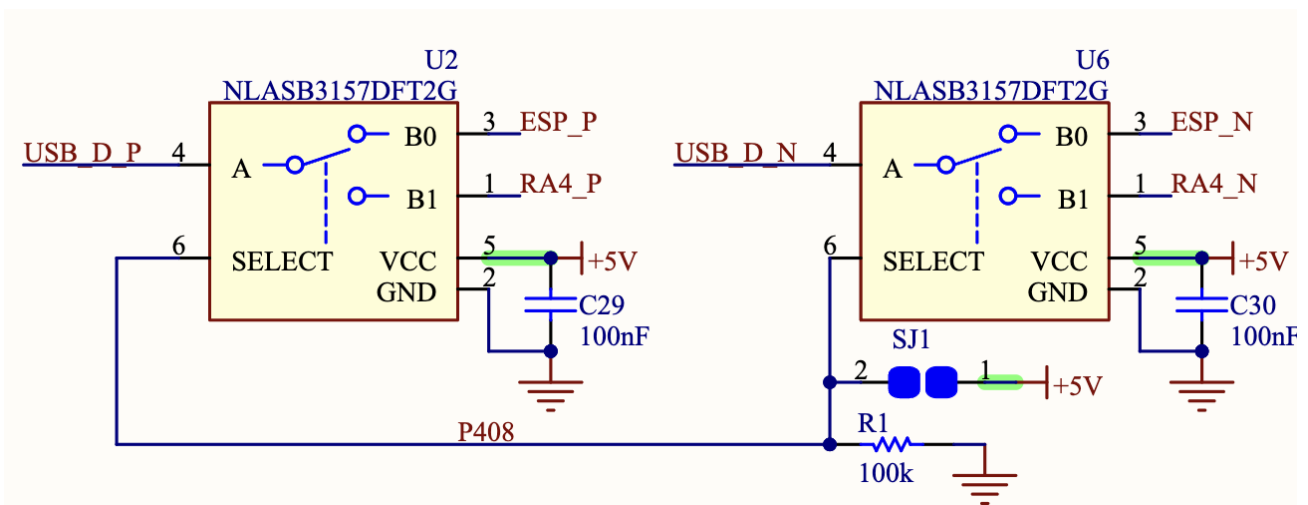
## ESP HEADER



ESP header (schematic)

### 6.2 USB Bridge

When programming the UNO R4 WiFi, the RA4M1 MCU is programmed via the ESP32-S3 module by default. The **U2** and **U6** switches can switch the USB communication to go directly to the RA4M1 MCU, by writing a high state to the P408 pin (D40).



Soldering together the **SJ1** pads permanently sets the USB communication directly to the RA4M1, bypassing the ESP32-S3.

## 7 USB Connector

The UNO R4 WiFi has one USB-C® port, used to power and program your board as well as sending & receiving serial communication.

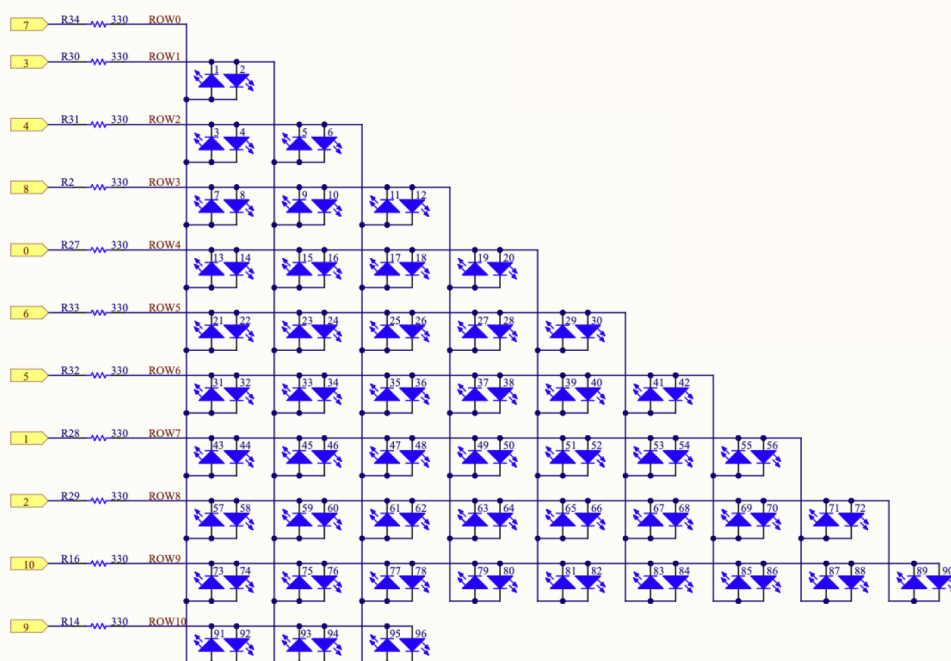
**Note:** The board should not be powered with more than 5 V via the USB-C® port.

## 8 LED Matrix

The UNO R4 WiFi features a 12x8 matrix of red LEDs (**U\_LEDMATRIX**), connected using the technique known as charlieplexing.

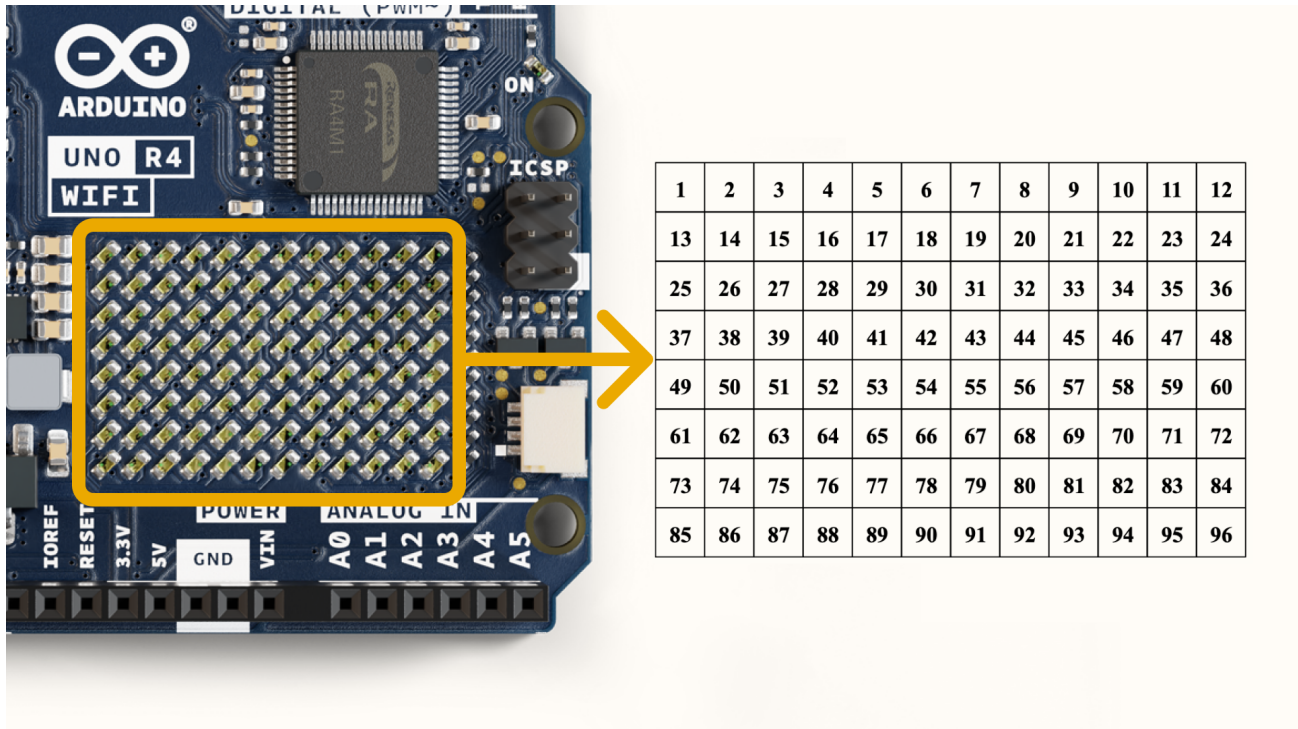
The following pins on the RA4M1 MCU are used for the matrix:

- P003
- P004
- P011
- P012
- P013
- P015
- P204
- P205
- P206
- P212
- P213



LED matrix schematics.

These LEDs can be accessed as an array, using a specific library. See the mapping below:



LED matrix number mapping.

This matrix can be used for a number of projects and prototyping purposes, and supports animation, simple game designs and scrolling text among other things.

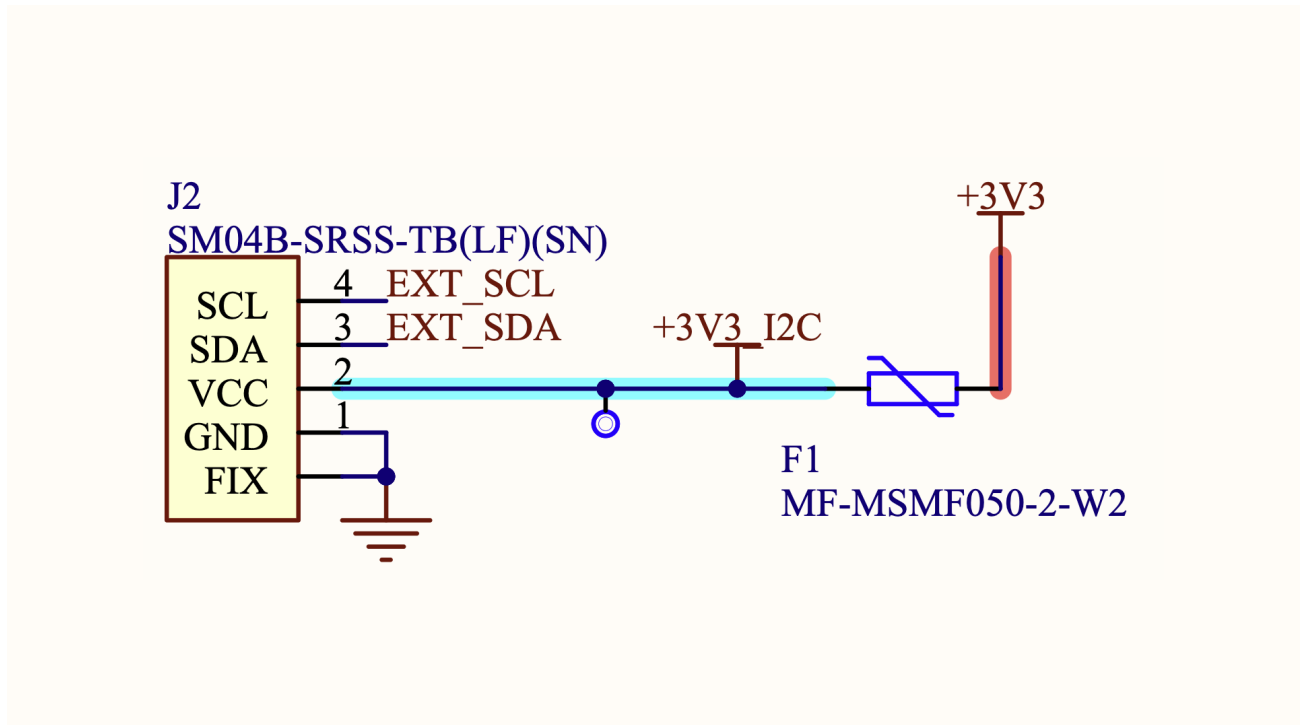
## 9 Digital Analog Converter (DAC)

The UNO R4 WiFi has a DAC with up to 12-bit resolution attached to the A0 analog pin. A DAC is used to convert a digital signal to an analog signal.

The DAC can be used for signal generation for e.g. audio applications, like generating and altering sawtooth waves.

## 10 I2C Connector

The I2C connector SM04B-SRSS-TB(LF)(SN) is connected to a secondary I2C bus on the board. Note that this connector is powered via 3.3 V.



I2C connector.

This connector also shares the following pin connections:

### JANALOG header

- A4
- A5

### JDIGITAL header

- SDA
- SCL

**Note:** as A4/A5 is connected to the main I2C bus, these should not be used as ADC inputs whenever the bus is in use. You can however connect I2C devices to each of these pins and connectors simultaneously.

## 11 Power Options

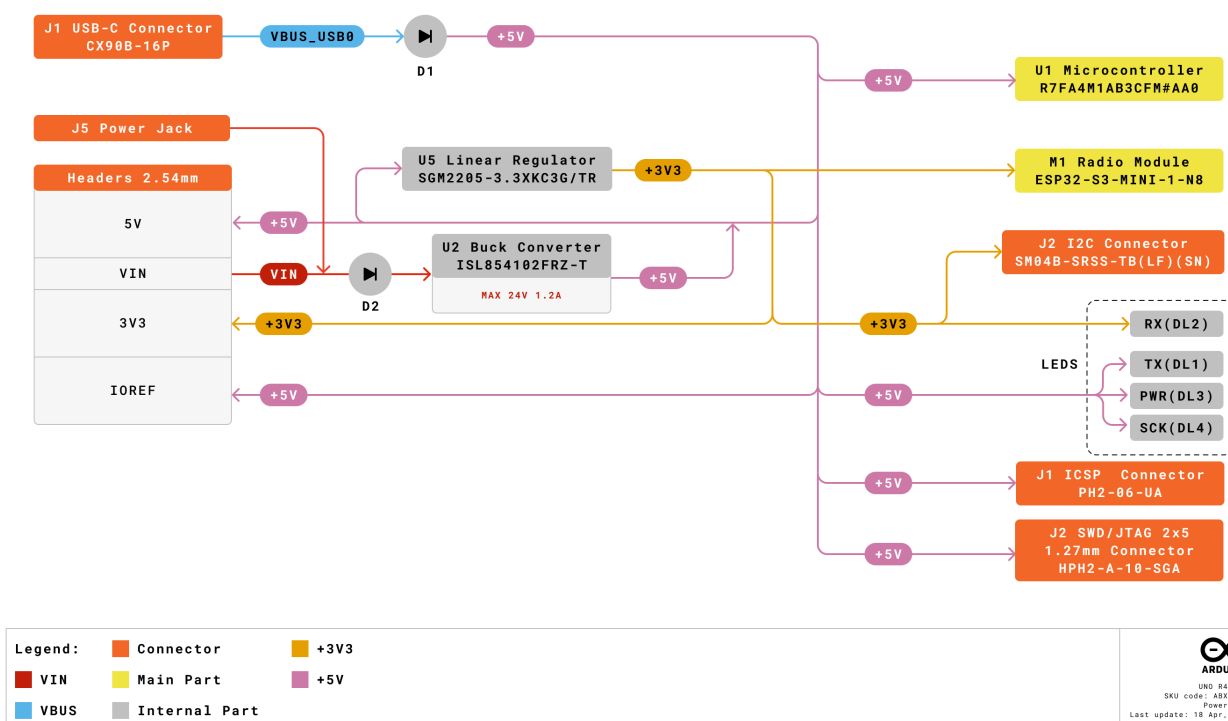
Power can either be supplied via the VIN pin, or via USB-C® connector. If power is supplied via VIN, the ISL854102FRZ buck converter steps the voltage down to 5 V.

Both VUSB and VIN pins are connected to the ISL854102FRZ buck converter, with Schottky diodes in place for reverse polarity & overvoltage protection respectively.

Power via USB supplies about ~4.7 V (due to Schottky drop) to the RA4M1 MCU.

The linear regulator (SGM2205-3.3XKC3G/TR) converts 5 V from either the buck converter or USB, and provides 3.3 V to a number of components, including the ESP32-S3 module.

### 11.1 Power Tree



Arduino UNO R4 WiFi power tree.





## 11.2 Pin Voltage

The general operating voltage for UNO R4 WiFi is 5 V, however the ESP32-S3 module's operating voltage is 3.3 V.

**Note:** It is **very** important that ESP32-S3's pins (3.3 V) do not come in contact with any of the RA4M1's pins (5 V), as this may damage the circuits.

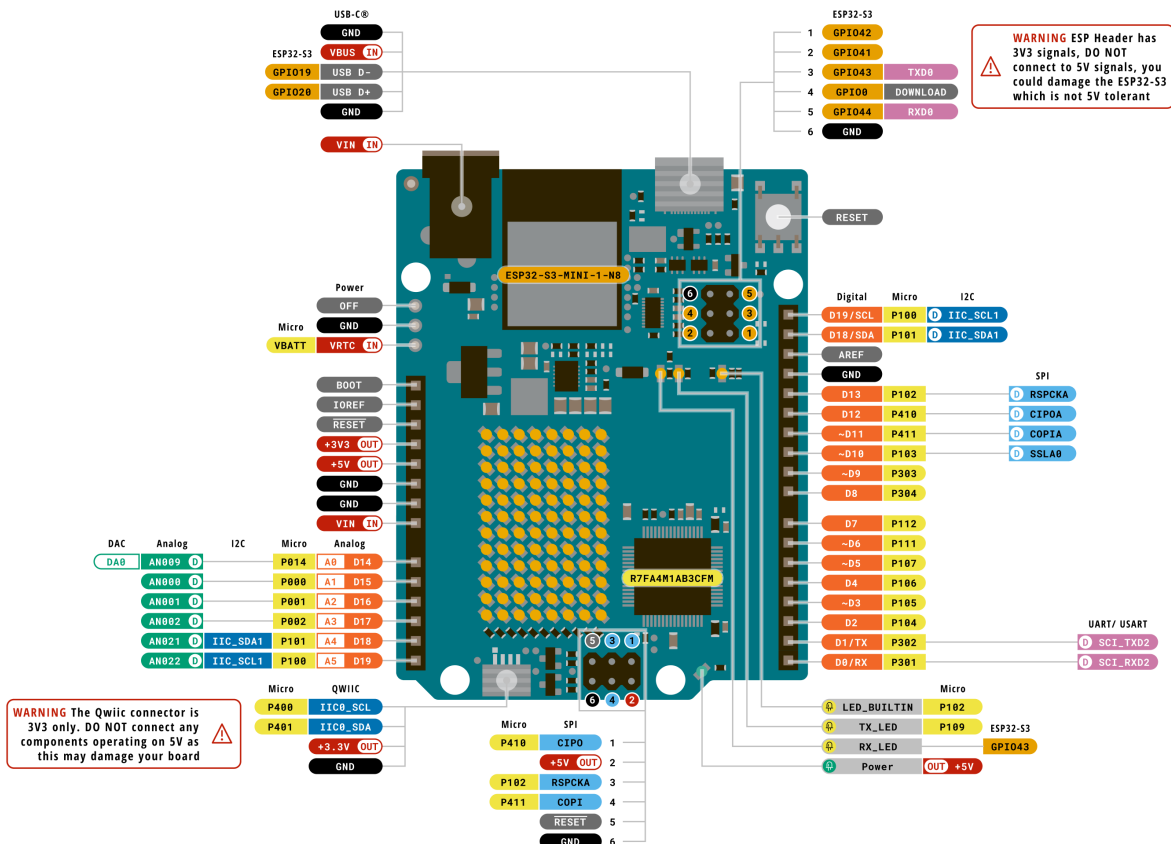
## 11.3 Pin Current

The GPIOs on the R7FA4M1AB3CFM#AA0 microcontroller can safely handle up to 8 mA of current. Never connect devices that draw higher current directly to a GPIO as this may damage the circuit.

For powering e.g. servo motors, always use an external power supply.

# Mechanical Information

## 12 Pinout



<b>Legend:</b>	<span style="color: orange;">■</span> Digital	<span style="color: blue;">■</span> I2C	<span style="border: 1px solid blue; display: inline-block; width: 10px; height: 10px;"></span> Other SERIAL
<span style="color: red;">■</span> Power	<span style="border: 1px solid orange; display: inline-block; width: 10px; height: 10px;"></span> Analog	<span style="color: lightblue;">■</span> SPI	<span style="color: green;">■</span> Analog
<span style="background-color: black; color: black;">■</span> Ground	<span style="background-color: yellow;">■</span> Main Part	<span style="color: purple;">■</span> UART/USART	<span style="border: 1px solid green; display: inline-block; width: 10px; height: 10px;"></span> PWM/Timer

ARDUINO  
 UNO R4 WiFi  
 SKU code: ABX00087  
 Pinout  
 Last update: 30 Jun, 2023

Pinout for UNO R4 WiFi.

## 12.1 Analog

Pin	Function	Type	Description
1	BOOT	NC	Not Connected
2	IOREF	IOREF	Reference for digital logic V - connected to 5 V
3	Reset	Reset	Reset
4	+3V3	Power	+3V3 Power Rail
5	+5V	Power	+5V Power Rail
6	GND	Power	Ground
7	GND	Power	Ground
8	VIN	Power	Voltage Input
9	A0	Analog	Analog input 0 / DAC
10	A1	Analog	Analog input 1 / OPAMP+
11	A2	Analog	Analog input 2 / OPAMP-
12	A3	Analog	Analog input 3 / OPAMPOut
13	A4	Analog	Analog input 4 / I2C Serial Datal (SDA)
14	A5	Analog	Analog input 5 / I2C Serial Clock (SCL)

## 12.2 Digital

Pin	Function	Type	Description
1	SCL	Digital	I2C Serial Clock (SCL)
2	SDA	Digital	I2C Serial Datal (SDA)
3	AREF	Digital	Analog Reference Voltage
4	GND	Power	Ground
5	D13/SCK/CANRX0	Digital	GPIO 13 / SPI Clock / CAN Receiver (RX)
6	D12/CIPO	Digital	GPIO 12 / SPI Controller In Peripheral Out
7	D11/COPI	Digital	GPIO 11 (PWM) / SPI Controller Out Peripheral In
8	D10/CS/CANTX0	Digital	GPIO 10 (PWM) / SPI Chip Select / CAN Transmitter (TX)
9	D9	Digital	GPIO 9 (PWM-)
10	D8	Digital	GPIO 8
11	D7	Digital	GPIO 7
12	D6	Digital	GPIO 6 (PWM-)
13	D5	Digital	GPIO 5 (PWM-)
14	D4	Digital	GPIO 4
15	D3	Digital	GPIO 3 (PWM-) / Interrupt Pin
16	D2	Digital	GPIO 2 / Interrupt Pin
17	D1/TX0	Digital	GPIO 1 / Serial 0 Transmitter (TX)
18	D0/TX0	Digital	GPIO 0 / Serial 0 Receiver (RX)

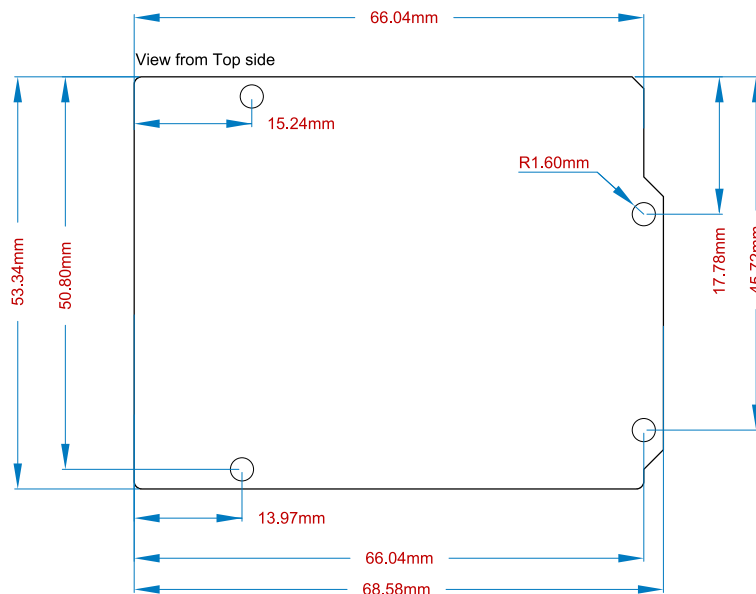
### 12.3 OFF

Pin	Function	Type	Description
1	OFF	Power	For controlling power supply
2	GND	Power	Ground
1	VRTC	Power	Battery connection to power RTC only

### 12.4 ICSP

Pin	Function	Type	Description
1	CIPO	Internal	Controller In Peripheral Out
2	+5V	Internal	Power Supply of 5 V
3	SCK	Internal	Serial Clock
4	COPI	Internal	Controller Out Peripheral In
5	RESET	Internal	Reset
6	GND	Internal	Ground

## 13 Mounting Holes And Board Outline



Top side Mechanical View of Arduino UNO R4 WiFi

## 14 Board Operation

### 14.1 Getting Started - IDE

If you want to program your UNO R4 WiFi while offline you need to install the Arduino® Desktop IDE **[1]**. To connect the UNO R4 WiFi to your computer, you will need a Type-C® USB cable, which can also provide power to the board, as indicated by the LED (DL1).

### 14.2 Getting Started - Arduino Web Editor

All Arduino boards, including this one, work out-of-the-box on the Arduino® Web Editor **[2]**, by just installing a simple plugin.

The Arduino Web Editor is hosted online, therefore it will always be up-to-date with the latest features and support for all boards. Follow **[3]** to start coding on the browser and upload your sketches onto your board.

### 14.3 Getting Started - Arduino Cloud

All Arduino IoT enabled products are supported on Arduino Cloud which allows you to log, graph and analyze sensor data, trigger events, and automate your home or business.

### 14.4 Online Resources

Now that you have gone through the basics of what you can do with the board you can explore the endless possibilities it provides by checking existing projects on Arduino Project Hub **[4]**, the Arduino Library Reference **[5]**, and the online store **[6]**; where you will be able to complement your board with sensors, actuators and more.

### 14.5 Board Recovery

All Arduino boards have a built-in bootloader which allows flashing the board via USB. In case a sketch locks up the processor and the board is not reachable anymore via USB, it is possible to enter bootloader mode by double-tapping the reset button right after the power-up.

## Certifications

### 15 Declaration of Conformity CE DoC (EU)

We declare under our sole responsibility that the products above are in conformity with the essential requirements of the following EU Directives and therefore qualify for free movement within markets comprising the European Union (EU) and European Economic Area (EEA).

### 16 Declaration of Conformity to EU RoHS & REACH 211 01/19/2021

Arduino boards are in compliance with RoHS 2 Directive 2011/65/EU of the European Parliament and RoHS 3 Directive 2015/863/EU of the Council of 4 June 2015 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

Substance	Maximum Limit (ppm)
Lead (Pb)	1000
Cadmium (Cd)	100
Mercury (Hg)	1000
Hexavalent Chromium (Cr6+)	1000
Poly Brominated Biphenyls (PBB)	1000
Poly Brominated Diphenyl ethers (PBDE)	1000
Bis(2-Ethylhexyl} phthalate (DEHP)	1000
Benzyl butyl phthalate (BBP)	1000
Dibutyl phthalate (DBP)	1000
Diisobutyl phthalate (DIBP)	1000

Exemptions : No exemptions are claimed.

Arduino Boards are fully compliant with the related requirements of European Union Regulation (EC) 1907 /2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH). We declare none of the SVHCs (<https://echa.europa.eu/web/guest/candidate-list-table>), the Candidate List of Substances of Very High Concern for authorization currently released by ECHA, is present in all products (and also package) in quantities totaling in a concentration equal or above 0.1%. To the best of our knowledge, we also declare that our products do not contain any of the substances listed on the "Authorization List" (Annex XIV of the REACH regulations) and Substances of Very High Concern (SVHC) in any significant amounts as specified by the Annex XVII of Candidate list published by ECHA (European Chemical Agency) 1907 /2006/EC.

## 17 Conflict Minerals Declaration

As a global supplier of electronic and electrical components, Arduino is aware of our obligations with regards to laws and regulations regarding Conflict Minerals, specifically the Dodd-Frank Wall Street Reform and Consumer Protection Act, Section 1502. Arduino does not directly source or process conflict minerals such as Tin, Tantalum, Tungsten, or Gold. Conflict minerals are contained in our products in the form of solder, or as a component in metal alloys. As part of our reasonable due diligence Arduino has contacted component suppliers within our supply chain to verify their continued compliance with the regulations. Based on the information received thus far we declare that our products contain Conflict Minerals sourced from conflict-free areas.

## 18 FCC Caution

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference
- (2) this device must accept any interference received, including interference that may cause undesired operation.

### **FCC RF Radiation Exposure Statement:**

1. This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
2. This equipment complies with RF radiation exposure limits set forth for an uncontrolled environment.
3. This equipment should be installed and operated with a minimum distance of 20 cm between the radiator & your body.

**Note:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

English: User manuals for licence-exempt radio apparatus shall contain the following or equivalent notice in a conspicuous location in the user manual or alternatively on the device or both. This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

- (1) this device may not cause interference



(2) this device must accept any interference, including interference that may cause undesired operation of the device.

French: Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

(1) l'appareil n' doit pas produire de brouillage

(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

**IC SAR Warning:**

English This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

French: Lors de l' installation et de l' exploitation de ce dispositif, la distance entre le radiateur et le corps est d' au moins 20 cm.

**Important:** The operating temperature of the EUT can't exceed 85 °C and shouldn't be lower than -40 °C.

Hereby, Arduino S.r.l. declares that this product is in compliance with essential requirements and other relevant provisions of Directive 2014/53/EU. This product is allowed to be used in all EU member states.

## 19 SRRC

This equipment contains a radio transmitter module with model approval code: CMIIT ID: 2022DP6085.

## 20 Company Information

<b>Company name</b>	<b>Arduino SRL</b>
Company Address	Via Andrea Appiani, 25 - 20900 MONZA (Italy)





## 21 Reference Documentation

Ref	Link
Arduino IDE (Desktop)	<a href="https://www.arduino.cc/en/Main/Software">https://www.arduino.cc/en/Main/Software</a>
Arduino IDE (Cloud)	<a href="https://create.arduino.cc/editor">https://create.arduino.cc/editor</a>
Cloud IDE Getting Started	<a href="https://docs.arduino.cc/cloud/web-editor/tutorials/getting-started/getting-started-web-editor">https://docs.arduino.cc/cloud/web-editor/tutorials/getting-started/getting-started-web-editor</a>
Project Hub	<a href="https://create.arduino.cc/projecthub?by=part&amp;part_id=11332&amp;sort=trending">https://create.arduino.cc/projecthub?by=part&amp;part_id=11332&amp;sort=trending</a>
Library Reference	<a href="https://github.com/arduino-libraries/">https://github.com/arduino-libraries/</a>
Online Store	<a href="https://store.arduino.cc/">https://store.arduino.cc/</a>

## 22 Change Log

Date	Revision	Changes
19/09/2023	4	Update FCC section
25/07/2023	3	Update Pin Table
30/06/2023	2	Update Pinout File
08/06/2023	1	First Release

(ZH)

Arduino® UNO R4 WiFi 是一款基于 ESP32-S3 Wi-Fi® 芯片 (ESP32-S3-MINI-1-N8) 的 UNO 兼容开发板。它搭载了 Renesas RA4M1 微控制器 (R7FA4M1AB3CFM#AA0)，主频为 48 MHz，采用 Arm® Cortex®-M4 内核。该开发板配备了 256 kB 闪存、32 kB SRAM 和 8 kB EEPROM。

RA4M1 微控制器支持 5V 供电，ESP32-S3 芯片支持 3.3V 供电。MCU 固件可通过 TXB0108DQSR 接口进行更新。



XXXXXXXXXX

**R7FA4M1AB3CFM#AA0** XXXXXXXXXXXXRA4M1, UNO R4 WiFi MCUXXXXXXXXXXXXXXXXXXXX

- XX
  - 48 MHz Arm® Cortex®-M4XXXXXXXXXXXX (FPU)
  - 5VXXXX
  - XXXX(RTC)
  - XXXXXX(MPU)
  - XXXXXX(DAC)

- XX
  - 256kB XX
  - 32kB SRAM
  - 8kB XXXXXXEEPROM

- XX
  - XXXXXXXXXXXXCTSUX
  - USB 2.0 XXXX (USBFS)
  - 14XADC
  - XX12XDAC
  - XXXXXX (OPAMP)

- XX
  - RA4M1XXXXXXXX5V
  - XXXXXX(VIN)06-24 V
  - XXXXXXVIN006-24 V
  - XXUSB-C@XX,0005V

- XX
  - 1XUARTXXXXD0XD1
  - 1XSPIXXXXD10-D13XICSPXXXX
  - 1XI2CXXXXA4XA5XSDAXSCL
  - 1XCANXXXXD4XD5XXXXXXXXXX

XXXXXXXXXX R7FA4M1AB3CFM#AA0 XXXXXXXX

- R7FA4M1AB3CFM#AA0 XXX

**ESP32-S3-MINI-1-N8** XXXMCUXXXXXXXXWi-Fi@Bluetooth@XXXXXXXXXXXX3.3VXXXXXXXXXXXX(TXB0108DQSR)XRA4M1X  
XX

- XX



- Xtensa® ESP32-LX7
- 3.3V
- 40 MHz
- **Wi-Fi®**
  - 802.11 b/g/n Wi-Fi® Wi-Fi® 4
  - 150 Mbps
  - 2.4
- **Bluetooth®**
  - Bluetooth® 5

ESP32-S3-MINI-1-N8

- ESP32-S3-MINI-1-N8

## 23

### 23.1

UNO R4 WiFi 32KB SRAM, 8KB AVR UNO UNO R4 WiFi

14 I/O 6 I2C SPI UART 256KB 8KB SRAM 32KB 16MHz 48MHz 3

ESP32-S3 Wi-Fi® Bluetooth® 12x8 LED Arduino LED

UNO R4 WiFi

Arduino

**LED** 12x8 LED



### 23.1.1

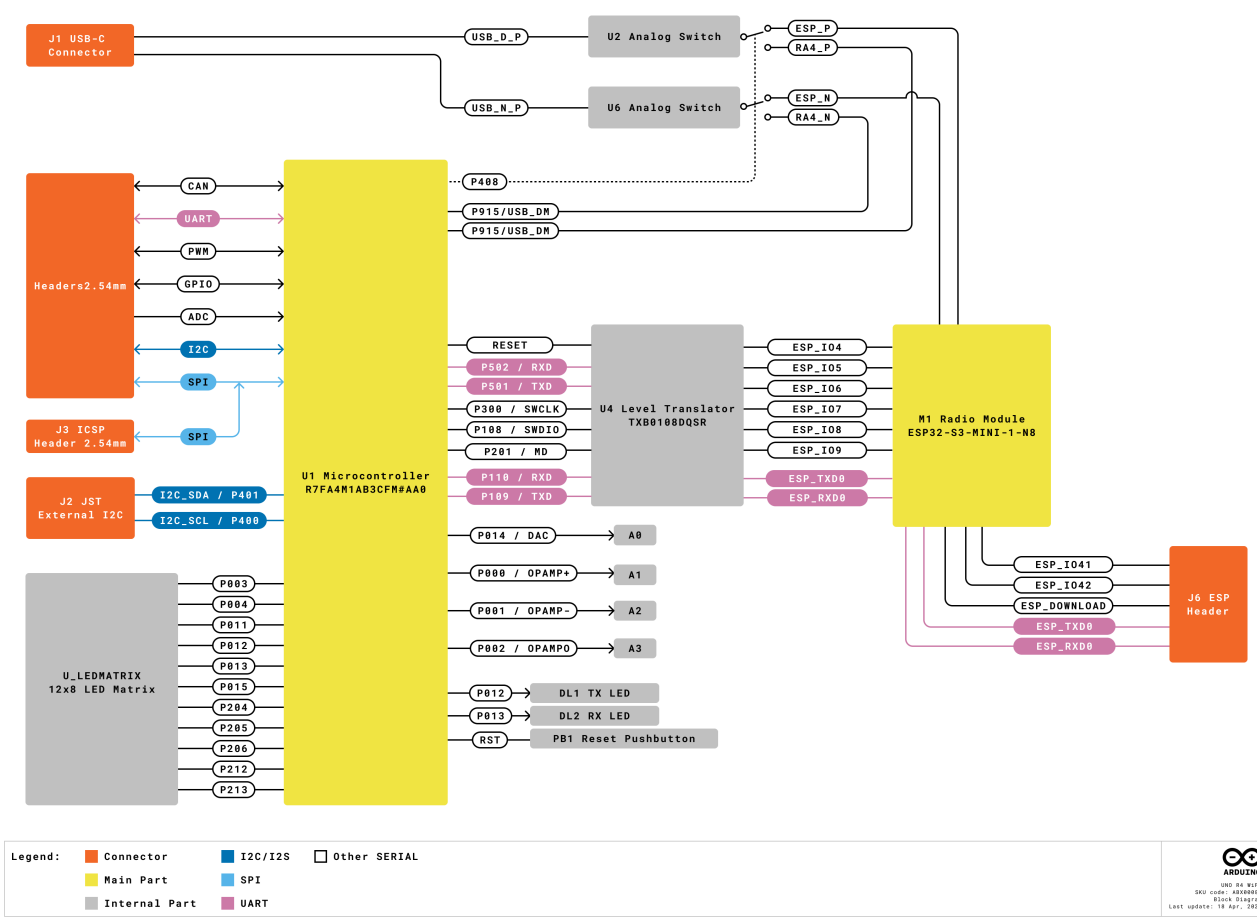
- UNO R3
- UNO R3 SMD
- UNO R4 Minima

## 24

Symbol	Description	Min	Typ	Max	Unit
$V_{IN}$	VIN pin / DC input	6	7.0	24	V
$V_{USB}$	USB input	4.8	5.0	5.5	V
$T_{OP}$	Operating temperature	-40	25	85	°C

$V_{DD}$  is 5V,  $V_{AREF}$  is 0V

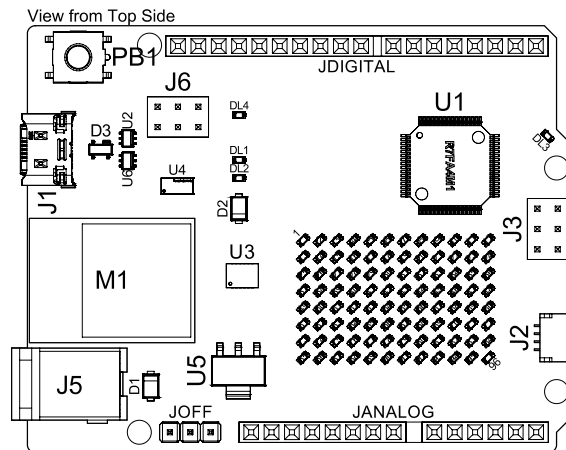
## 25



Arduino R4 WiFi

## 26

## 26.1



Arduino UNO R4 WiFi

Symbol	Description
U1	R7FA4M1AB3CFM#AA0 IC
U2	NLASB3157DFT2G
U3	ISL854102FRZ-T
U4	TXB0108DQSR 5 V - 3.3 V
U5	SGM2205-3.3XKC3G/TR 3.3 V
U6	NLASB3157DFT2G
U_LEDMATRIX	12x8 LED
M1	ESP32-S3-MINI-1-N8
PB1	RESET
JANALOG	
JDIGITAL	
JOFF	OFF, VRTC
J1	CX90B-16P USB-C®
J2	SM04B-SRSS-TB(LF)(SN) I2C
J3	ICSP SPI
J5	
J6	ESP
DL1	LED TX

Pin	Component
DL2	LED RX
DL3	LED
DL4	LED SCK
D1	PMEG6020AELRX
D2	PMEG6020AELRX
D3	PRTR5V0U2X,215 ESD

## 27 (R7FA4M1AB3CFM#AA0)

UNO R4 WiFi uses Renesas RA4M1 microcontroller (R7FA4M1AB3CFM#AA0) with 48 MHz Arm® Cortex®-M4 core and FPU.

RA4M1 is a 5 V microcontroller for Arduino UNO.

R7FA4M1AB3CFM#AA0 features:

- 256kB / 32kB SRAM / 8kB EEPROM
- RTC
- 4x DMA channels (DMAC)
- 14 ADC
- 12 DAC
- UART
- CAN

For more details, see Renesas RA4M1 microcontroller.

## 28 Wi-Fi® / ESP32-S3-MINI-1-N8

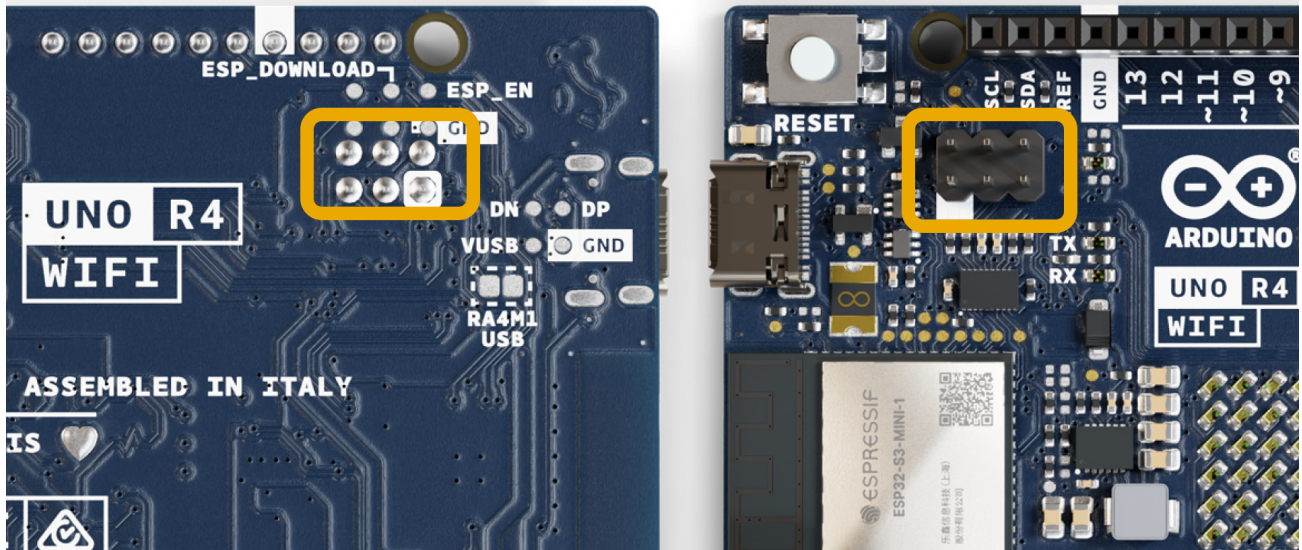
UNO R4 WiFi uses Wi-Fi® / LE ESP32-S3 SoC by Xtensa® with LX7 MCU and 2.4 GHz.

ESP32-S3-MINI-1-N8 features:

- Wi-Fi® 4 - 2.4 GHz
- LE
- 3.3V
- 384kB ROM
- 512kB SRAM
- 150 Mbps

UNO R4 WiFi uses MCU RA4M1 with 3.3 V and RA4M1 0.5 V.

## 28.1 ESP

 ESP HEADER

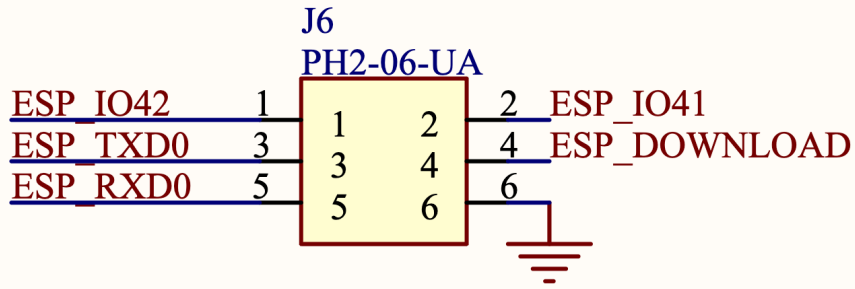
ESP00.

```
00RESET0000000000000000ESP32-S3000000000000
```

- ESP\_I042 - MTMS 00000 10
- ESP\_I041 - MTDI 00000 20
- ESP\_TXD0 - 00000UART0000 30
- ESP\_DOWNLOAD - 00000 40
- ESP\_RXD0-00000UART0000 50
- GND - 00000 60



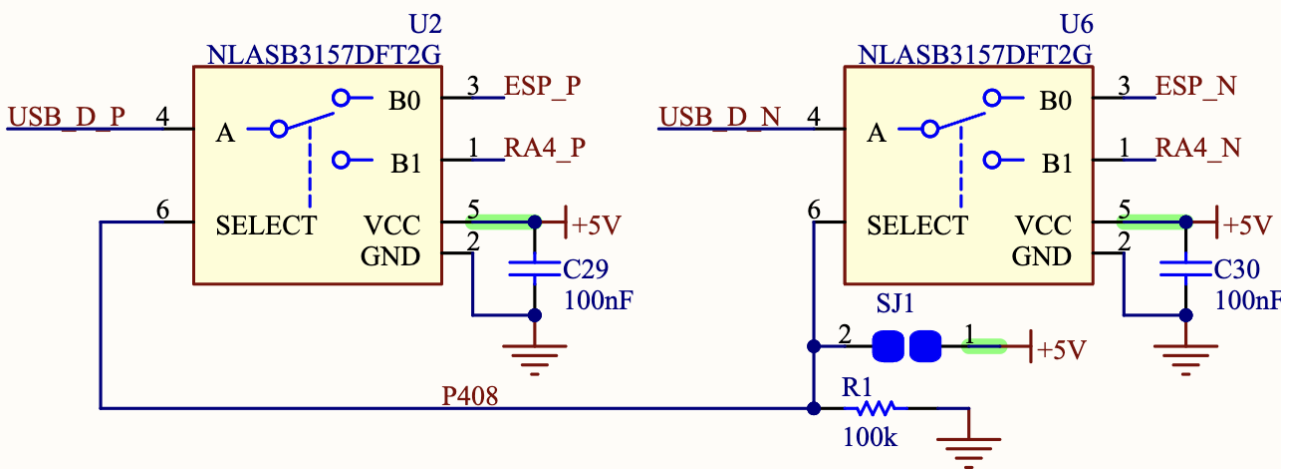
## ESP HEADER



ESP

### 28.2 USB

UNO R4 WiFi RA4M1 MCU ESP32-S3 P408 (D40) U2 U6 USB RA4M1 MCU



SJ1 USB RA4M1 ESP32-S3

## 29 USB

UNO R4 WiFi USB-C®

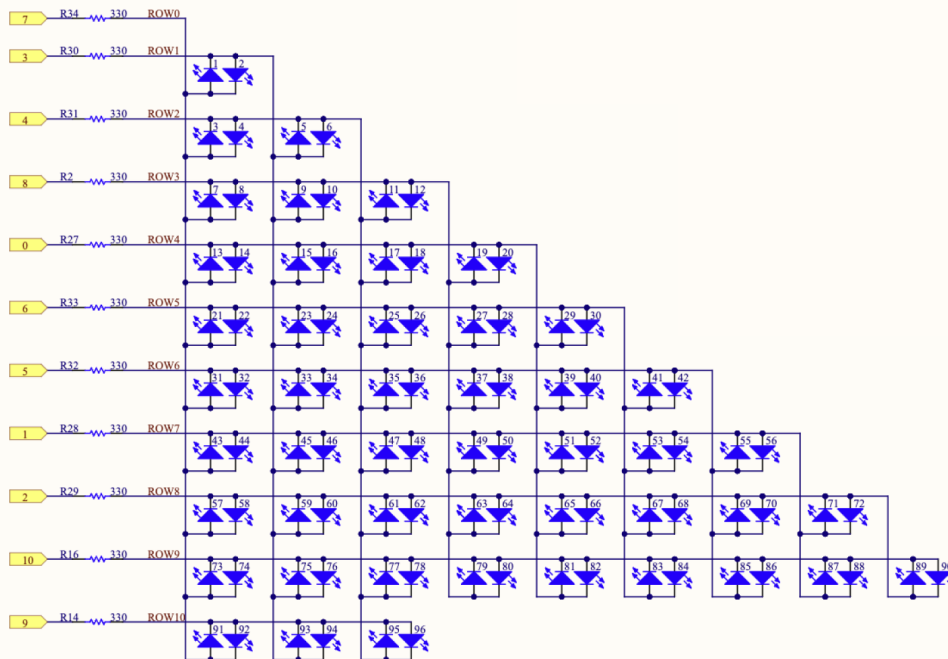
5V

## 30 LED

UNO R4 WiFi 12x8 LED (U\_LED MATRIX)

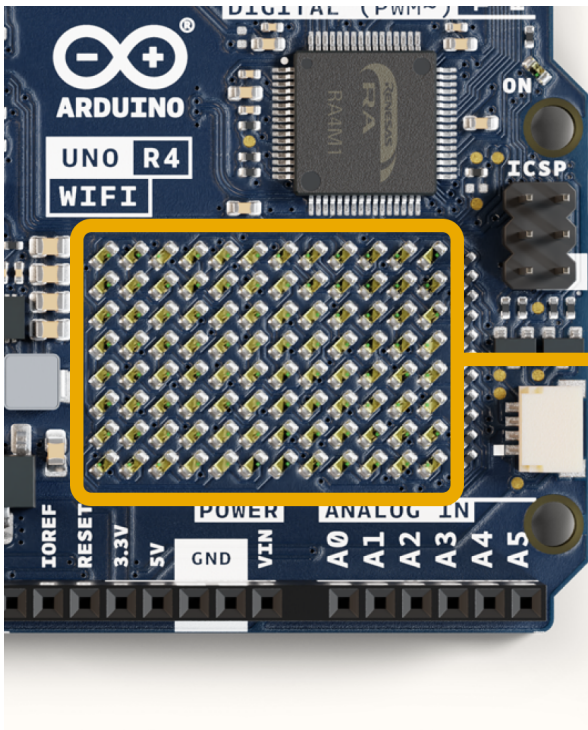
RA4M1 MCU

- P003
- P004
- P011
- P012
- P013
- P015
- P204
- P205
- P206
- P212
- P213



LED

LED



1	2	3	4	5	6	7	8	9	10	11	12
13	14	15	16	17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72
73	74	75	76	77	78	79	80	81	82	83	84
85	86	87	88	89	90	91	92	93	94	95	96

LED

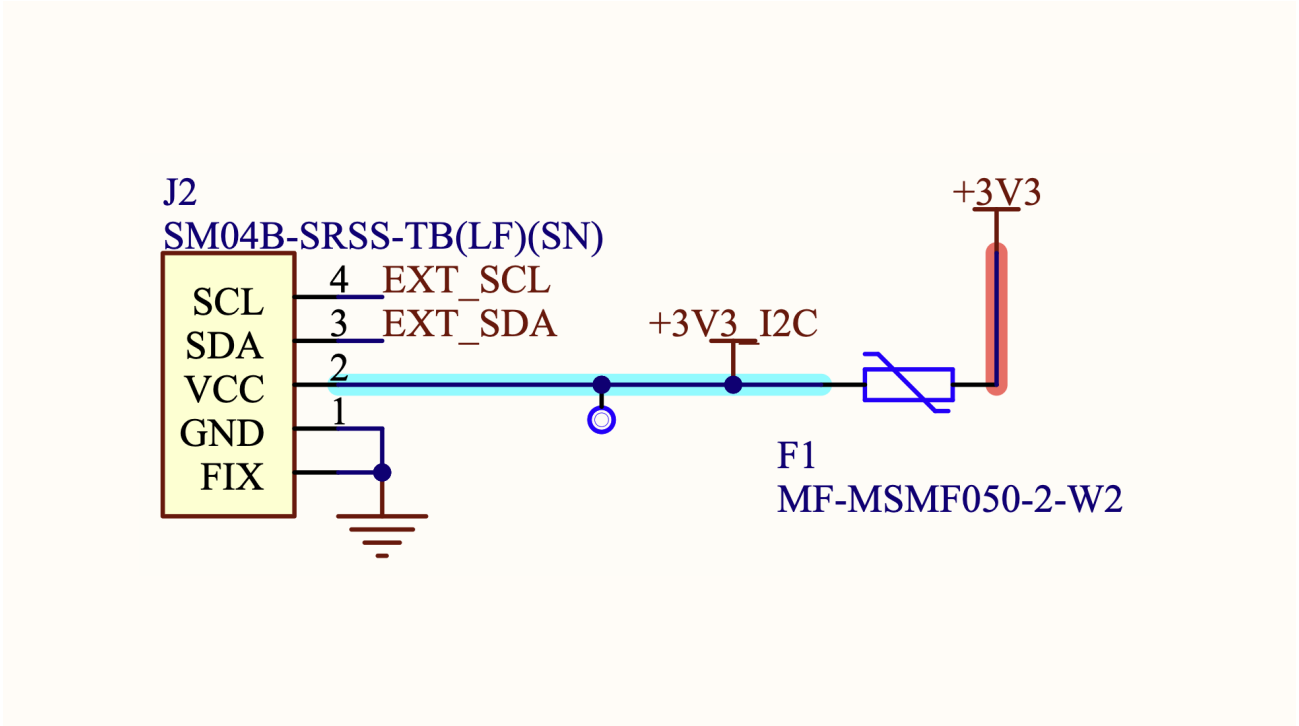
### 31 (DAC)

UNO R4 WiFi A0 12 DAC DAC

DAC

### 32 I2C

I2C SM04B-SRSS-TB(LF)(SN) I2C 3.3V



I2C.

XXXXXXXXXXXX

#### JANALOG

- A4
- A5

#### JDIGITAL

- SDA
- SCL

000 00A4/A5 I2C ADC I2C

### 33

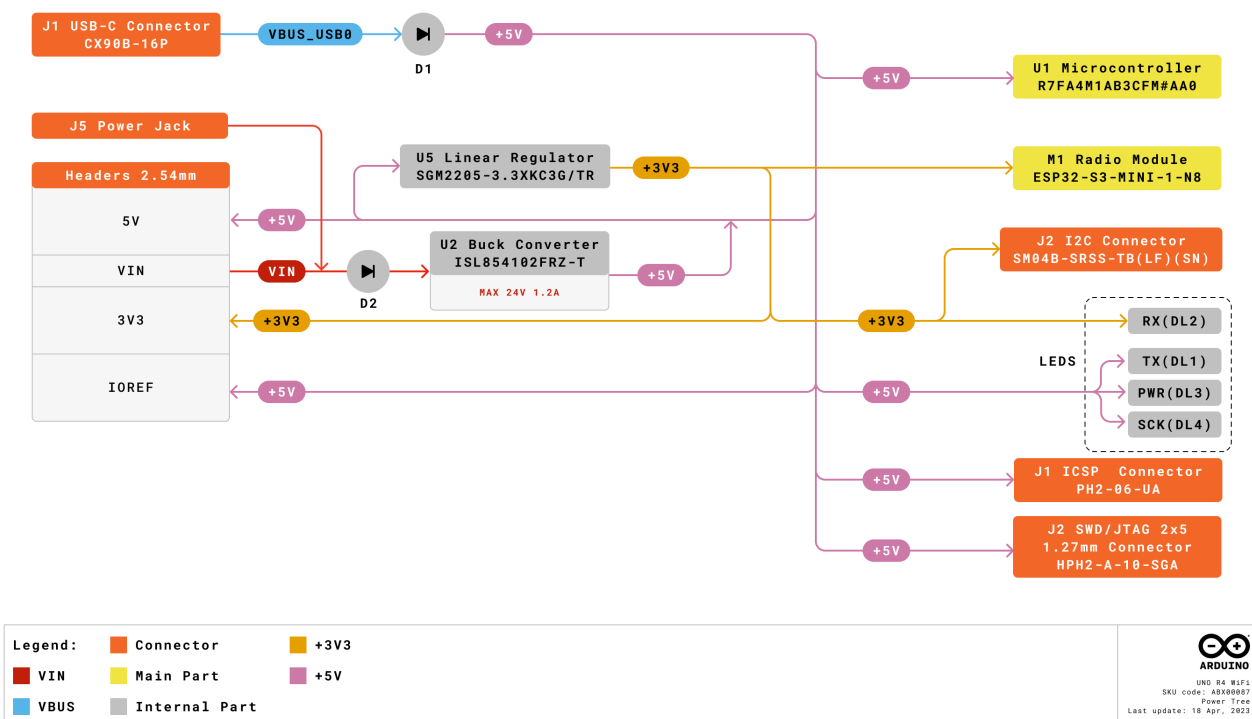
Power supply and voltage regulation components.

Microcontroller and radio module components.

Microcontroller operating voltage: ~4.7V

Microcontroller and radio module operating voltage: 3.3V

#### 33.1



Arduino UNO R4 WiFi



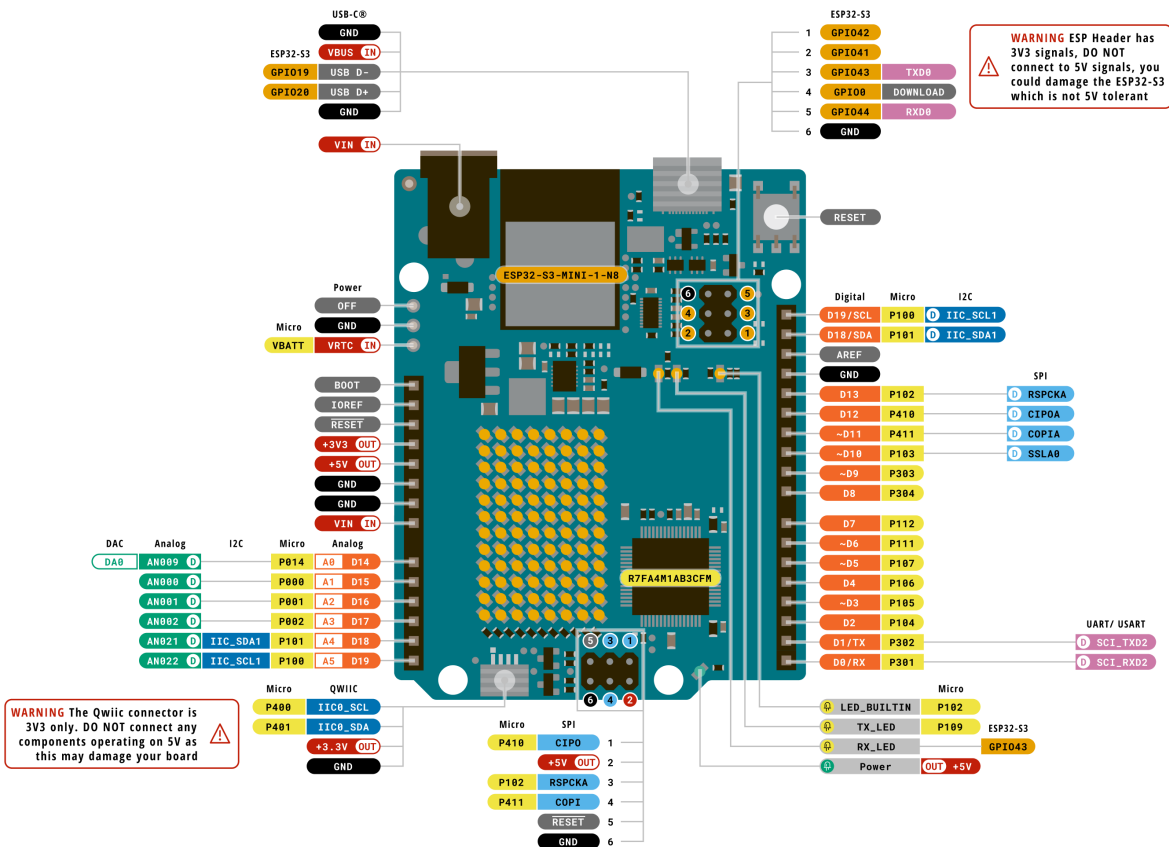
### 33.2

UNO R4 WiFi 5V ESP32-S3 3.3V

ESP32-S3 3.3V RA4M1 5V

### 33.3

R7FA4M1AB3CFM#AA0 GPIO 8mA GPIO



<b>Legend:</b>	<span style="color: orange;">■</span> Digital	<span style="color: blue;">■</span> I2C	<span style="border: 1px solid blue; display: inline-block; width: 10px; height: 10px;"></span> Other SERIAL
<span style="color: red;">■</span> Power	<span style="border: 1px solid orange; display: inline-block; width: 10px; height: 10px;"></span> Analog	<span style="color: lightblue;">■</span> SPI	<span style="color: green;">■</span> Analog
<span style="background-color: black; color: black;">■</span> Ground	<span style="background-color: yellow;">■</span> Main Part	<span style="color: purple;">■</span> UART/USART	<span style="border: 1px solid green; display: inline-block; width: 10px; height: 10px;"></span> PWM/Timer

ARDUINO  
UNO R4 WiFi  
SKU code: ABX00087  
Pinout  
Last update: 30 Jun, 2023

UNO R4 WiFi □□□□□

## 34.1

Pin	Label	Function	Notes
1	BOOT	NC	
2	IOREF	IOREF	IOREF V - 5 V
3	Reset	Reset	
4	+3V3		+3V3
5	+5V		+5V
6	GND		
7	GND		
8	VIN		
9	A0		0 / DAC
10	A1		1 / OPAMP+
11	A2		2 / OPAMP-
12	A3		3 / OPAMPOut
13	A4		4 / I2C SDA
14	A5		5 / I2C SCL

## 34.2

Pin	Label	Function	Notes
1	SCL		I2C SCL
2	SDA		I2C SDA
3	AREF		
4	GND		
5	D13/SCK/CANRX0		GPIO 13 / SPI SCK / CAN RX
6	D12/CIPO		GPIO 12 / SPI CS
7	D11/COPI		GPIO 11 / PWM / SPI CS
8	D10/CS/CANTX0		GPIO 10 / PWM / SPI CS / CAN TX
9	D9		GPIO 9 (PWM)
10	D8		GPIO 8
11	D7		GPIO 7
12	D6		GPIO 6 (PWM)
13	D5		GPIO 5 (PWM)
14	D4		GPIO 4
15	D3		GPIO 3 (PWM) / CS
16	D2		GPIO 2 / CS
17	D1/TX0		GPIO 1 / TX0
18	D0/TX0		GPIO 0 / TX0 (RX)



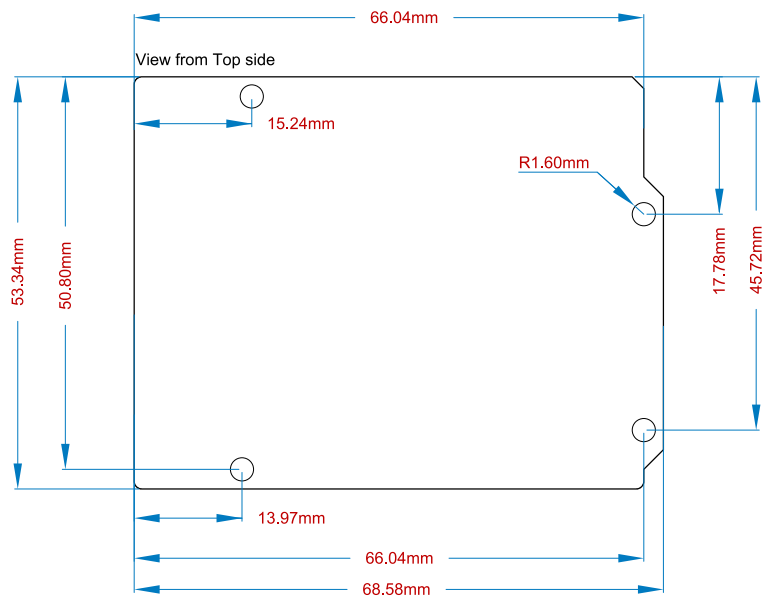
## 34.3

Pin	Mode	Pin	Function
1	OFF	Pin	Power
2	GND	Pin	Power
1	VRTC	Pin	RTC Power

## 34.4 ICSP

Pin	Mode	Pin	Function
1	CIPO	Pin	ICSP Pin
2	+5V	Pin	5V Power
3	SCK	Pin	ICSP Pin
4	COPI	Pin	ICSP Pin
5	RESET	Pin	Reset
6	GND	Pin	Power

## 35



Arduino UNO R4 WiFi



## 36

### 36.1 - IDE

UNO R4 WiFi Arduino® Desktop IDE <sup>[1]</sup> UNO R4 WiFi Type-C® USB LED (DL1)

### 36.2 - Arduino Web Editor

Arduino Arduino® Web Editor <sup>[2]</sup>

Arduino Web Editor **[3]**

### 36.3 - Arduino Cloud

Arduino Cloud Arduino IoT

### 36.4

Arduino Project Hub <sup>[4]</sup> Arduino Library Reference <sup>[5]</sup> <sup>[6]</sup>

### 36.5

Arduino USB USB

## 37 CE DoC EU

EU



### 38 EU RoHS & REACH 211 01/19/2021

Arduino RoHS 2002011/65/EU 20150604 RoHS 3002015/863/EU

Item	Limit (ppm)
Pb (Pb)	1000
Cd (Cd)	100
Hg (Hg)	1000
Cr6+ (Cr6+)	1000
PBB (PBB)	1000
PBDE (PBDE)	1000
2-DEHP (DEHP)	1000
BBP (BBP)	1000
DBP (DBP)	1000
DIBP (DIBP)	1000

00 0000000

Arduino (EC) 1907 /2006 (REACH) SVHCs (https://echa.europa.eu/web/guest/candidate-list-table) 0.1% REACH XIV ECHA 1907 /2006/EC XVII (SVHC)

### 39

Arduino 1502 Arduino Arduino



## 40 FCC

本產品符合 FCC 第 15 條之規定

FCC 第 15 條之規定

(1) 本產品不得產生干擾

(2) 本產品必須接受任何干擾，包括可能導致設備不正確運作的干擾

### FCC 第 15 條之規定

1. 本產品不得產生干擾

2. 本產品必須接受任何干擾，包括可能導致設備不正確運作的干擾

3. 本產品必須與人體保持至少 20 厘米的距離

本產品符合 FCC 第 15 條之規定。本產品符合工業部 Canada 之免執照 RSS 標準(s)。操作須符合以下兩個條件：

- 本產品不得產生干擾
- 本產品必須接受任何干擾，包括可能導致設備不正確運作的干擾
- 本產品必須與人體保持至少 20 厘米的距離
- 本產品必須與人體保持至少 20 厘米的距離

English: User manuals for licence-exempt radio apparatus shall contain the following or equivalent notice in a conspicuous location in the user manual or alternatively on the device or both. This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

(1) this device may not cause interference

(2) this device must accept any interference, including interference that may cause undesired operation of the device.

French: Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

(1) l' appareil n' doit pas produire de brouillage

(2) l' utilisateur de l' appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d' en compromettre le fonctionnement.

### IC SAR 000

English This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

French Lors de l' installation et de l' exploitation de ce dispositif, la distance entre le radiateur et le corps est d' au moins 20 cm.

本產品符合 EUT 標準，工作溫度為 85°C 至 -40°C

Arduino S.r.l. 符合 CE 標準 2014/53/EU 之規定



## 41 SRRC

CMIIIT ID: 2022DP6085

## 42

Arduino SRL
Via Andrea Appiani, 25 - 20900 MONZA (Italy)

## 43

Ref	Link
Arduino IDE (Desktop)	<a href="https://www.arduino.cc/en/Main/Software">https://www.arduino.cc/en/Main/Software</a>
Arduino IDE (Cloud)	<a href="https://create.arduino.cc/editor">https://create.arduino.cc/editor</a>
Cloud IDE Getting Started	<a href="https://docs.arduino.cc/cloud/web-editor/tutorials/getting-started/getting-started-web-editor">https://docs.arduino.cc/cloud/web-editor/tutorials/getting-started/getting-started-web-editor</a>
Project Hub	<a href="https://create.arduino.cc/projecthub?by=part&amp;part_id=11332&amp;sort=trending">https://create.arduino.cc/projecthub?by=part&amp;part_id=11332&amp;sort=trending</a>
Library Reference	<a href="https://github.com/arduino-libraries/">https://github.com/arduino-libraries/</a>
Online Store	<a href="https://store.arduino.cc/">https://store.arduino.cc/</a>

## 44

日期	** 数量 **	备注
19/09/2023	4	FCC 认证
25/07/2023	3	
30/06/2023	2	
08/06/2023	1	