

## DESCRIPTION

**METE HOCA Akana R1** is a user-friendly and compact development board designed to make STEM coding practical and enjoyable, built on Raspberry Pi's RP2040 microcontroller. What sets the Akana R1 apart from other boards is its built-in OLED display and user buttons.

The Akana R1 features a 1.3-inch **I2C OLED display** and a set of 4+2 **user buttons** arranged in a game controller format. These six buttons are equipped with a special **debounce** circuit to prevent unwanted multiple presses (button bouncing). The **BOOTSEL** and **RESET** buttons necessary for coding are also located on the top of the board.

The Akana R1 uses the RP2040 microcontroller developed by Raspberry Pi and has a **USB Type-C** connector for connecting to a computer. The USB connection is not only for coding but also allows the Akana R1 to function as a keyboard or game controller when connected to a computer.

The board's most important feature is the **AkanaPort** header connection. AkanaPort includes all the digital and analog pins of the RP2040, along with power connections. The colorful labels on the AkanaPort header help prevent connection errors and ensure easy usage. For advanced users, the board also includes an **I2C selection switch**, enabling all I2C components on the board and AkanaPort to be switched to the desired I2C channel simultaneously.

On the front of the board, there are 2 LEDs, and on the back, there are 4 LEDs. The first LED on the front is marked with "**ON**" in the upper left corner, indicating that the board is powered. In the upper right corner, there is a built-in coding LED under user control, connected to the RP2040's GP25 pin. The four LEDs on the back, spread across the corners, are also connected to **GP25**, just like the user LED on the front.

The Akana R1 has everything you need to program the RP2040 microcontroller it is built upon. All you need to do is connect the board to your computer via a USB cable to start learning, experimenting, and having fun.

The Akana R1 can be programmed using Arduino IDE, MicroPython, or CircuitPython.

## SPECIFICATIONS

### 1. Raspberry Pi RP2040 Microcontroller

- 133 MHz dual-core Arm Cortex-M0+ processor
- 264 KB SRAM
- Supports QSPI flash up to 16 MB
- 30 GPIO pins (4 of which can be used for analog input)
- 3.3V logic level
- 12-bit 500 ksps ADC
- 2 UART, 2 I2C, and 2 SPI controllers
- 16-channel PWM controller
- 8 Programmable I/O (PIO) controllers
- Built-in UF2 bootloader

### 2. Winbond 2 MB (optional 8 or 16 MB) QSPI flash memory

### 3. Standardized 40-PIN AkanaPort Header

- Access to all RP2040 pins
- Descriptive color-coded label on the header
- Pins arranged for easy use
- Selectable I2C connection (SDA-SCL)
- 3V3, 5V, VIN, and GND power pins

### 4. 1.3-inch I2C OLED Display

- Easy-to-use SSD1306 controller (I2C address: 0x3C)
- White OLED (optional blue)
- Optional OLED with SH1106 controller

### 5. 6 User Buttons

- 6x6mm 250 gF tactile buttons
- Dedicated debounce circuit to prevent button bouncing

### 6. BOOTSEL and RESET buttons

### 7. Power LED (ON)

### 8. User LED

- Signal LED connected to GP25 on the front side
- Usable with the LED\_BUILTIN constant in Arduino IDE
- 4 additional LEDs connected to GP25 on the back side
- Rear LEDs can be disconnected from GP25 and connected to the power line
- LEDs are driven by MOSFETs to avoid loading the GP25 line

### 9. I2C Channel Selection Switch

- Ability to switch SDA-SCL lines between the OLED display and AkanaPort
- Option to choose between I2C0 (GP4-GP5) and I2C1 (GP6-GP7)

### 10. External Debugging Header

- External programming with SWD and SWC pins
- Ability to operate through a programmer/debug probe with 3V3 and GND pins

### 11. Disableable I2C Pull-up Resistors

### 12. Type-C USB Connector

- Can be used to power or program the board
- Supports up to 5V 3A power via USB on compatible devices
- 3A polyfuse to protect the USB line

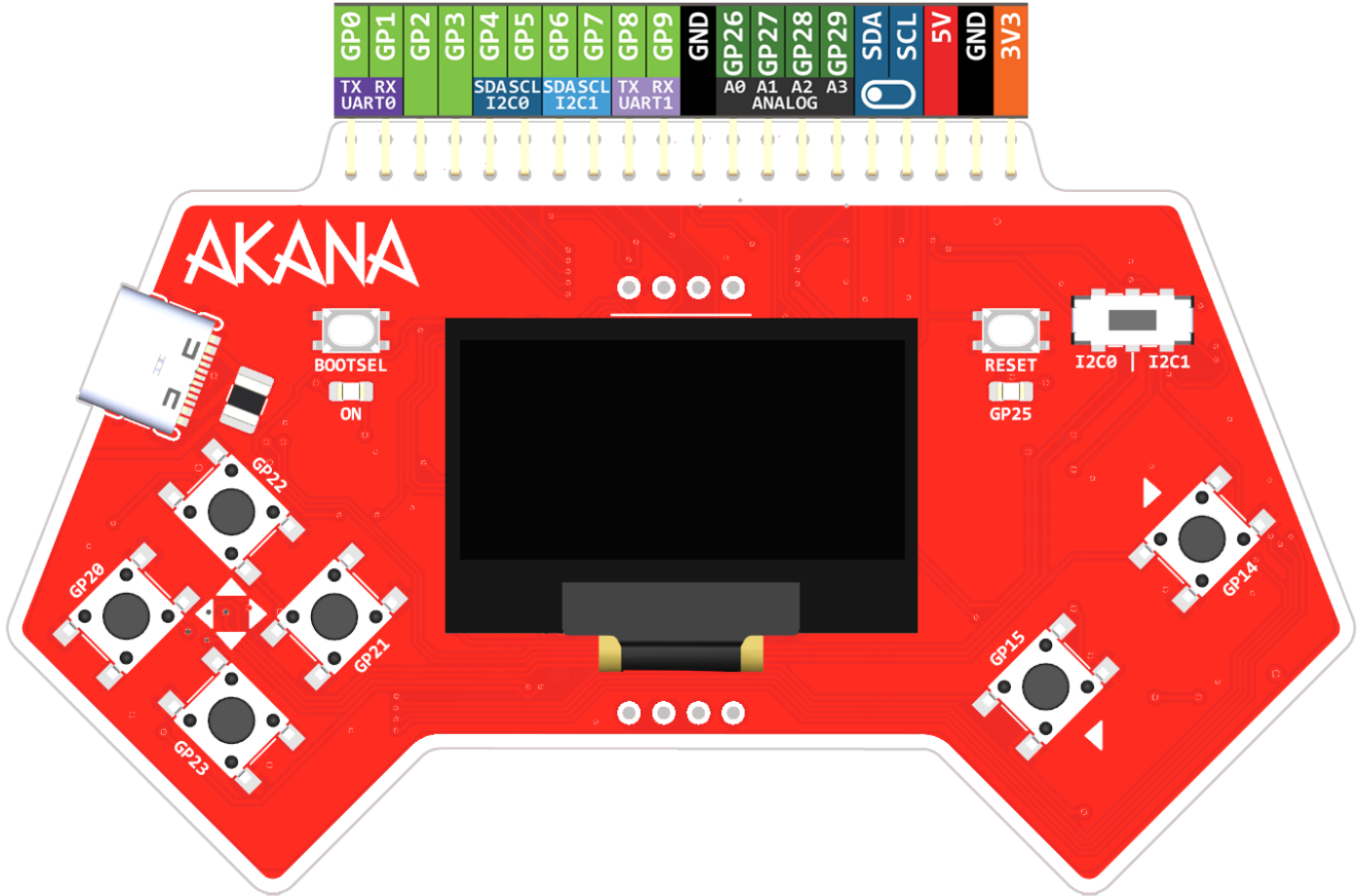
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## USAGE GUIDELINES

METE HOCA Akana R1, like any electronic device, is sensitive to short circuits and can be damaged if placed on a conductive surface, if conductive objects fall on it, or if it comes into contact with liquids.

As with all development boards, Akana R1 should never be used on metal surfaces, and no conductive objects should be allowed to touch it.



When not in use, the USB cable or any devices supplying power to the Akana R1 should be disconnected from the board, and the board should be stored in its packaging to prevent damage. Leaving cards or cables connected to the AkanaPort can cause the header socket to loosen over time, leading to poor connections.

The I2C OLED display is attached to the Akana R1 PCB with foam double-sided tape. The OLED display is not resistant to impacts and may break if subjected to any pressure or impact. Attempting to remove the screen from its position or exposing it to heat can cause it to break or malfunction.

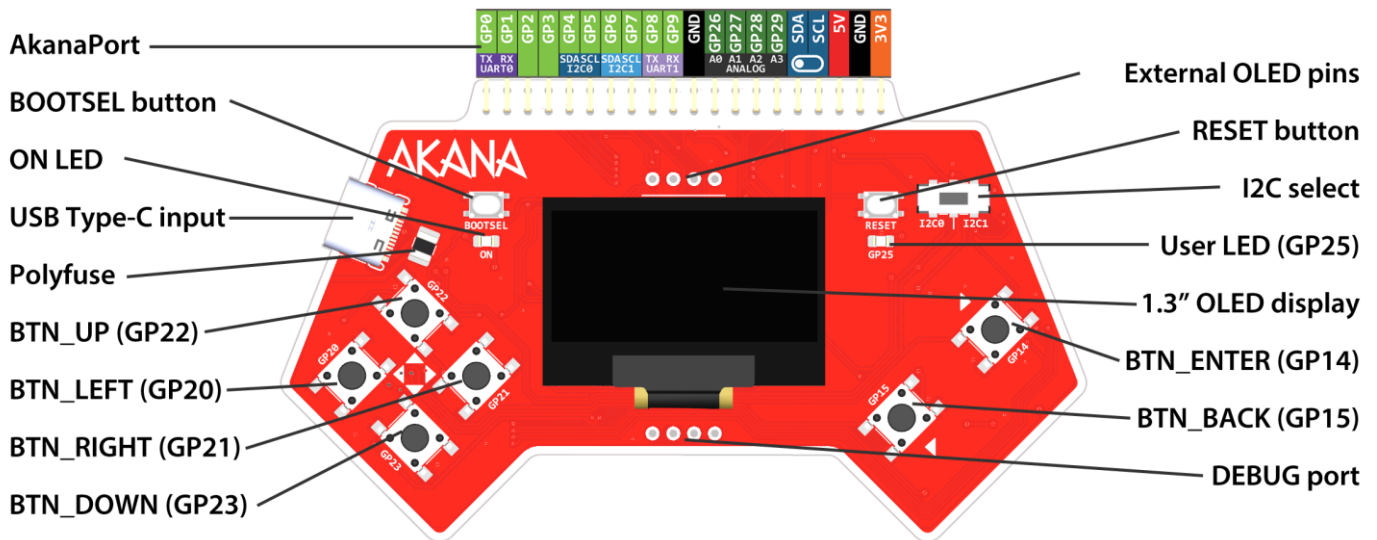
The maximum voltage that can be supplied through the VIN input on the AkanaPort is 14 volts. Supplying more voltage may cause the voltage regulator on the Akana R1 to overheat and fail.

The maximum voltage that can be supplied through the 5V input on the AkanaPort is 5.5 volts. The Akana R1 should not be connected to a computer via USB while being powered through the 5V pin.

The maximum voltage that can be supplied through the 3V3 input on the AkanaPort is 3.5 volts. Supplying more voltage may damage the components on the Akana R1.

## GETTING TO KNOW AKANA R1

Below is the front side of the **Akana R1**. The core components of the board include the **RP2040** microcontroller, AkanaPort, **OLED display**, and **user buttons**. This design eliminates the need to connect external OLED displays and buttons, allowing you to fully utilize the capabilities of the RP2040 without requiring additional peripherals.



The OLED display on the Akana R1 is **1.3 inches** in size and connects to the RP2040 via the **I2C** protocol (I2C address: **0x3C**). The display panel is either soldered directly onto the Akana R1 or placed as a PCB module. For modular use, external OLED connections are also available on the board. The OLED display features the easily programmable **SSD1306** controller. The Akana R1 can also be obtained with the **SH1106** controller.

The board includes six buttons, positioned in a game controller-inspired layout with four buttons on the left side and two on the right. The four buttons on the left can be used as directional buttons (up, down, left, and right), while the two buttons on the right can be used as confirm and back buttons in projects.

On the front of the Akana R1, you'll also find the **BOOTSEL** and **RESET** buttons, which assist in coding the RP2040 microcontroller. Holding down the BOOTSEL button while powering the board puts the RP2040 into **UF2** bootloader mode. The RESET button is connected to the **RUN** pin of the microcontroller and restarts the loaded code.

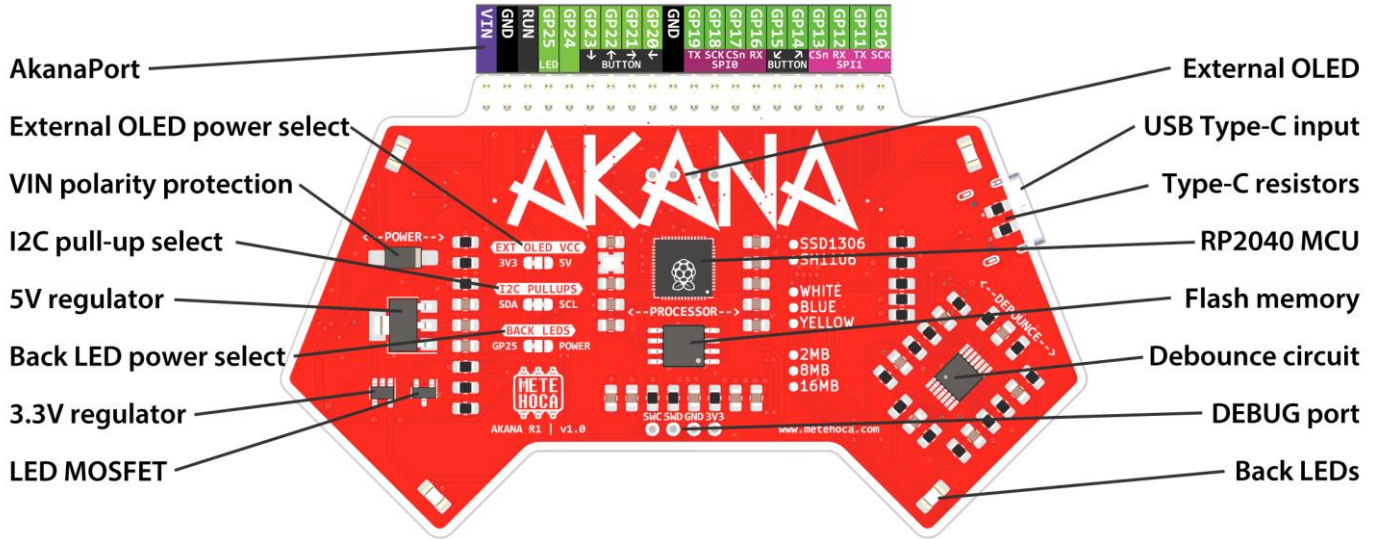
Below the buttons are two LEDs. The one on the left, labeled "**ON**," indicates that the board is powered and functioning correctly. The **GP25** LED on the right is connected to the GP25 pin of the RP2040 and can be controlled through coding.

On the left side of the board, you can see the USB port used for both coding and powering the board. This modern Type-C connector is designed to meet USB standards and is directly connected to the RP2040 microcontroller. You can connect the Akana R1 to a computer via this USB port for coding, or use a power bank or USB charger to power it.

The USB connection of the Akana R1 is protected against short circuits and overloads by an automatic fuse. This **polyfuse** heats up under excessive load, cutting off the circuit to prevent damage to the Akana or the computer. When the short circuit is resolved, the polyfuse cools down and reconnects the circuit.

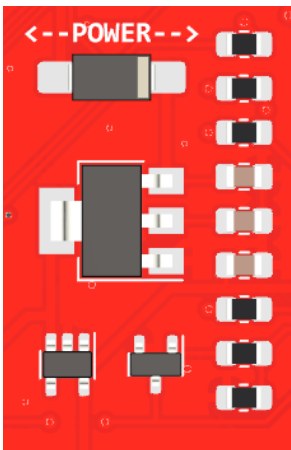


The back side of the Akana R1, shown below, contains all the essential components for the board's operation, the hardware configuration it was manufactured with, and a set of additional settings that can be adjusted if needed.



The components on the back side of the Akana R1 are primarily grouped into three main categories: power regulation, microcontroller components, and the button debounce circuit.

The power regulation section, marked as **POWER** on the board, is designed to meet the power needs of both the Akana and any components connected via the AkanaPort. The board can be powered through the VIN input on the AkanaPort with a voltage range of 7-14 volts, or it can be operated by providing a well-regulated 5 volts through the 5V line, or 3.3 volts through the 3V3 line.



The VIN input on the AkanaPort is protected against reverse polarity connections by a **Schottky diode**. However, there is no such protection on the 5V and 3.3V lines, so extreme caution is required when supplying power through these lines.

The 5V regulator on the Akana R1 reduces the power from the VIN pin to 5 volts, with a maximum current draw of 600 milliamps. The recommended load current for the 5V line is no more than 500 mA.

The 3.3V regulator on the board is connected to the output of the 5V regulator, stepping down the 5-volt supply to the Akana's operating voltage of 3.3 volts. The maximum current draw from this line is 500 milliamps, with a recommended limit of 300 mA.

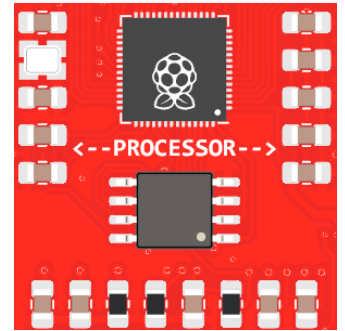
In addition to the GP25 LED on the front of the board, there are four more LEDs on the back, all connected to the same microcontroller pin. These four LEDs are positioned at the corners of the board and are designed to light up alongside the front GP25 LED when the connected GP25 pin is activated.

To prevent excessive loading on the RP2040 microcontroller, all these LEDs are connected through an external MOSFET. This setup reduces the load on the MCU and, thanks to the high input impedance of the MOSFET, prevents conflicts from the external use of GP25.

The Akana R1 is built on the RP2040 microcontroller developed by the Raspberry Pi team. Unlike the Raspberry Pi Pico, which is also created by this team, the Akana R1 allows users to utilize all the digital and analog input/output pins available on the microcontroller.

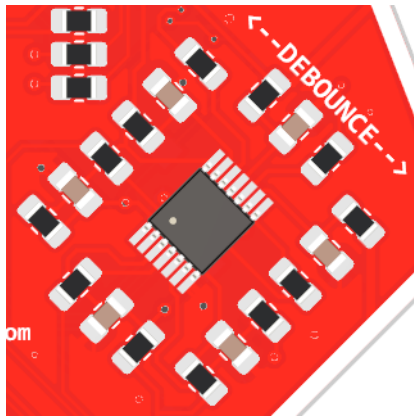
The microcontroller section of the board is located in the middle of the back side and is labeled as "**PROCESSOR**." The main components in this section include the Raspberry Pi-produced RP2040 microcontroller and the Winbond-produced QSPI serial flash memory.

By default, the Akana R1 features the Winbond W25Q16 model, which has a memory capacity of 16M-bits, or 2 MB. Optionally, flash chips with capacities of 8MB or 16MB can be used.



On either side of the RP2040 microcontroller, there are decoupling capacitors needed for its proper operation, along with a 12 MHz crystal oscillator that generates the basic operating frequency required by the RP2040.

Below the flash chip, there are components arranged for the filter capacitors and control resistors of the internal OLED screen attached to the Akana R1. This section is unused if an external OLED screen is utilized.



One of the key features that distinguishes the Akana R1 from other development boards is its carefully placed buttons, which are protected from unintended presses by a **debounce** circuit. This phenomenon, known as **button bouncing**, occurs when the metal parts of the button mechanism strike each other rapidly upon pressing, causing the button to send multiple signals instead of just one.

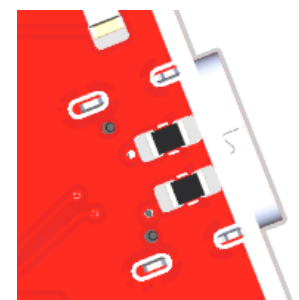
While microcontrollers can read pins quickly enough to capture these rapid presses within milliseconds, it can lead to situations where a single press is interpreted as multiple presses in the loaded code.

To prevent this, the Akana R1 includes a **Schmitt-trigger** integrated circuit along with associated resistors and capacitors, forming an **RC circuit** known as a **debouncer**. This circuit is designed not only to filter out bounce signals but also to prevent short circuits that may occur if the associated pin is accidentally set as an output.

The buttons used on the Akana R1 are connected to the RP2040 microcontroller using the **pull-down** technique. This ensures that when the button is pressed, the microcontroller reads a value of **1 (HIGH)**, and when it is not pressed, it reads a value of **0 (LOW)**.

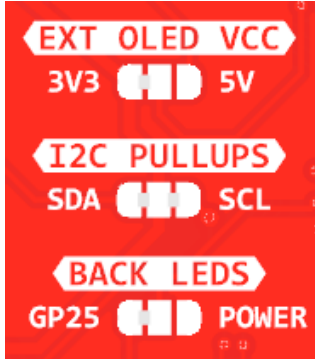
The Akana R1 utilizes the latest **Type-C** connector for its USB connection. This connector allows for easy insertion in either direction and, unlike previous generations, supports higher current usage.

Considering not only the board's own power requirements but also the energy demands of externally connected components and **docks**, a resistor configuration has been implemented that allows for up to **3 Amperes** of power consumption via the Type-C connection. This enables the Akana R1 to be powered by both computers and Type-C chargers.



## JUMPER OPTIONS AND CONFIGURATION BOARD

The Akana R1 is designed for use in various configurations and includes several solder points that allow for modifications. This enables users to make choices tailored to specific needs that may require changes to the circuit.



This section is located on the back of the board between the power and microcontroller sections. The selected areas can be cut or reconnected through soldering as needed.

The Akana R1 features three different solder jumper settings:

**EXT OLED VCC Setting:** This allows selection of the supply voltage for an external OLED screen connected to the board. By default, it is set to 3.3V, meaning the external OLED module will receive 3.3V power. If an internal OLED screen is used, this setting does not affect the connected display. The METE HOCA custom module

operating at 3.3V is used with models featuring an external OLED screen; setting this to 5V **will** damage the display due to overvoltage. Most OLED modules on the market operate at 5V and have their own 3.3V regulator, so this setting should be changed to 5V for proper operation.

**I2C PULLUPS Setting:** This enables the disabling of the 10 kΩ pull-up resistors connected to the two lines of the I2C channel, which are controlled by the I2C selector switch on the front. Pull-up resistors are necessary for the I2C bus to function correctly; however, if too many modules are connected, their parallel pull-up resistors can significantly reduce the total resistance, negatively affecting data communication. In such cases, disabling the I2C pull-up resistors on the Akana R1 can be a solution.

**BACK LEDS Setting:** This allows adjustment of the power source for the four LEDs located at the corners of the Akana R1's back. These LEDs are connected by default to the GP25 pin and light up alongside the front GP25 LED. Depending on preference, these LEDs can be disconnected from GP25 and connected to the power line to light up directly when the Akana R1 is powered on, or they can be left unconnected to remain off.

The Akana R1 can be produced with different OLED panels and flash chips of various sizes based on customer orders. In such cases, the **configuration options** for the board can be accessed from the section on the back.

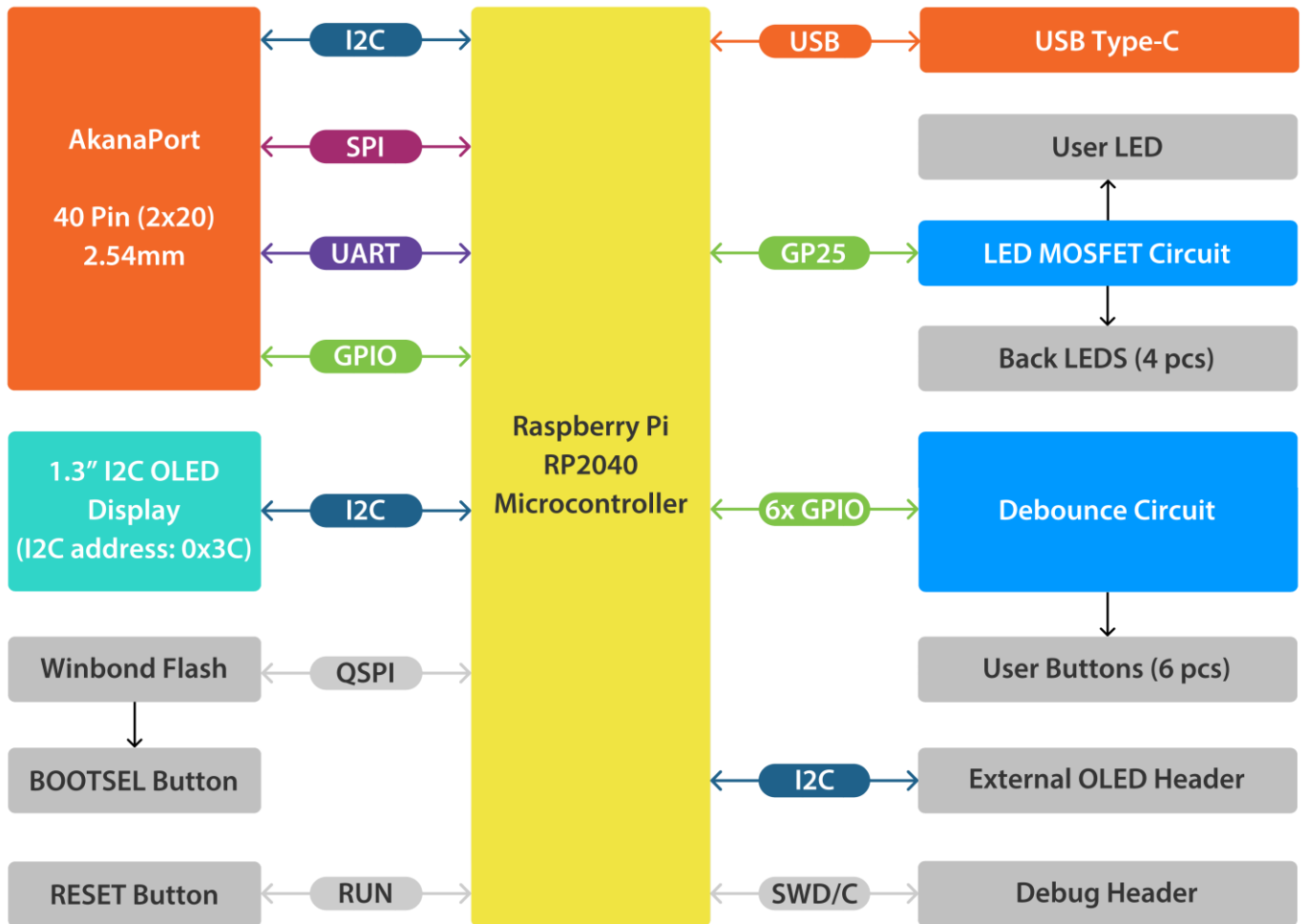
By default, the Akana R1 comes with a **white 1.3" OLED** panel featuring an **SSD1306** controller and a **2MB flash memory** chip. The SSD1306 is a widely supported controller with many libraries available for Arduino IDE, MicroPython, or CircuitPython. Although less common, an OLED panel with the SH1106 controller can also be requested due to its affordability.

The choice of memory depends on user needs; however, the default 2MB capacity is often more than sufficient for most applications.





## BLOCK DIAGRAM

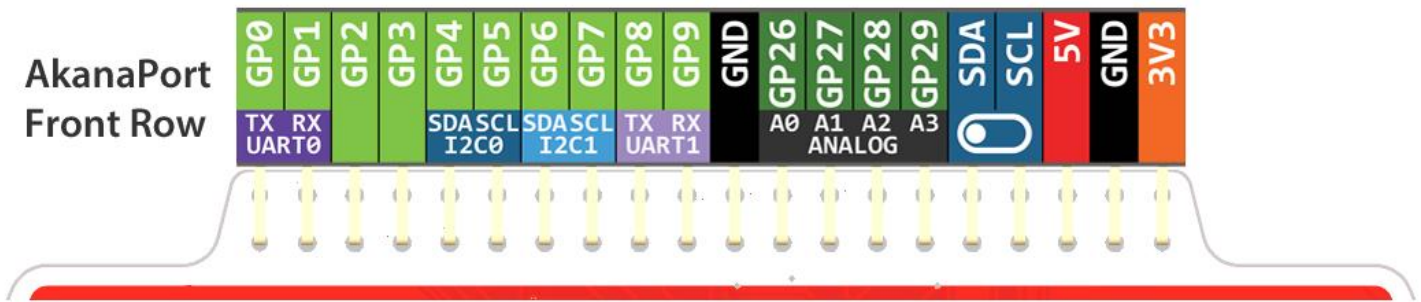


## AKANAPORT

The most significant feature of the Akana R1 is its standardized header connection known as **AkanaPort**, which provides access to **all the pins of the RP2040 microcontroller** it is built upon, as well as other pins needed for development.

AkanaPort consists of a 40-pin (2x20) female pin header with a 2.54mm spacing. It can be easily expanded using commonly available male pin header connectors.

While the Raspberry Pi Pico provides access to only 26 of the total 30 GPIO pins of the RP2040, AkanaPort allows access to **all 30 GPIO pins**, including the GP29 analog pin (A3) that is not accessible on the Pi Pico.



On the front row of AkanaPort, it is possible to access the **digital pins** from GP0 to GP9, along with all the **analog pins** from GP26 to GP29. The necessary connections for 3.3V, 5V, and Ground (**GND**) are also available in this section.

Additionally, the **SDA** and **SCL** lines for the I2C channel selected by the **I2C channel selector** on the Akana R1 are included in the front row. The I2C channel selector allows users to switch between the default **I2C0** pins, GP4 (SDA) and GP5 (SCL), and the more versatile **I2C1** pins, GP6 (SDA) and GP7 (SCL).

Designed to leverage the I2C protocol, the Akana R1 aims for easy usage by allowing I2C components to be connected directly to the **SDA and SCL** outputs set by the I2C channel selector on AkanaPort, rather than connecting them to the GPIO pins.



On the back row of AkanaPort, there are digital pins ranging from GP10 to GP19, along with additional digital pins from GP20 to GP25. Most of these pins are utilized by the six user buttons on the Akana R1, and access to the GP25 pin, which is connected to the internal LED, is also available from this section.

Additionally, this row features a **VIN** input for connecting external power supply of **up to 14 volts**, along with Ground (**GND**) connections. The **RUN** pin, which serves as the reset connection for the RP2040, can also be accessed from this section.

## AKANAPORT GPIO ALTERNATIVE USAGE TABLE (BASIC)

Thanks to the flexible design of the RP2040 microcontroller, all GPIO pins can serve multiple functions. For instance, **I2C**, **UART**, and **SPI** channels do not need to be fixed to specific pins; they can be assigned to any supporting pins. The default pin assignments are provided in the table below.

**NOTE:** Unlike the 5 Volt operating Arduino Uno, the RP2040 microcontroller operates at a **3.3 Volt logic level**, meaning it outputs 3.3 Volts when set to HIGH. GPIO pins are **not tolerant to 5 Volts!**

### AkanaPort Front Row

UART0 TX	GP0
UART0 RX	GP1
	GP2
	GP3
I2C0 SDA	GP4
I2C0 SCL	GP5
I2C1 SDA	GP6
I2C1 SCL	GP7
UART1 TX	GP8
UART1 RX	GP9
	GND
ADC A0	GP26
ADC A1	GP27
ADC A2	GP28
ADC A3	GP29
	SDA
	SCL
	5V
	GND
	3V3

### AkanaPort Back Row

GP10	SPI1 SCK
GP11	SPI1 TX
GP12	SPI1 RX
GP13	SPI1 CSn
GP14	BTN ENTER
GP15	BTN BACK
GP16	SPI0 RX
GP17	SPI0 CSn
GP18	SPI0 SCK
GP19	SPI0 TX
GND	
GP20	BTN LEFT
GP21	BTN RIGHT
GP22	BTN UP
GP23	BTN DOWN
GP24	
GP25	LED
RUN	
GND	
VIN	

## AKANAPORT GPIO ALTERNATIVE USAGE TABLE (EXTENDED)

The **flexibility** of the RP2040 microcontroller's design can be seen in the table below. The communication channels that are defined by **default** are highlighted in **bold**.

AkanaPort Front Row					AkanaPort Back Row				
UART0 TX	SPI0 RX	I2C0 SDA	UART0 TX	GP0	GP10	SPI1 SCK	I2C1 SDA	SPI1 SCK	
UART0 RX	SPI0 CSn	I2C0 SCL	UART0 RX	GP1	GP11	SPI1 TX	I2C1 SCL	SPI1 TX	
	SPI0 SCK	I2C1 SDA		GP2	GP12	SPI1 RX	I2C0 SDA	SPI1 RX	UART0 TX
	SPI0 TX	I2C1 SCL		GP3	GP13	SPI1 CSn	I2C0 SCL	SPI1 CSn	UART0 RX
UART1 TX	SPI0 RX	I2C0 SDA	I2C0 SDA	GP4	GP14	BTN ENTER	I2C1 SDA	SPI1 SCK	
UART1 RX	SPI0 CSn	I2C0 SCL	I2C0 SCL	GP5	GP15	BTN BACK	I2C1 SCL	SPI1 TX	
	SPI0 SCK	I2C1 SDA	I2C1 SDA	GP6	GP16	SPI0 RX	I2C0 SDA	SPI0 RX	UART0 TX
	SPI0 TX	I2C1 SCL	I2C1 SCL	GP7	GP17	SPI0 CSn	I2C0 SCL	SPI0 CSn	UART0 RX
UART1 TX	SPI1 RX	I2C0 SDA	UART1 TX	GP8	GP18	SPI0 SCK	I2C1 SDA	SPI0 SCK	
UART1 RX	SPI1 CSn	I2C0 SCL	UART1 RX	GP9	GP19	SPI0 TX	I2C1 SCL	SPI0 TX	
			GND		GND				
	SPI1 SCK	I2C1 SDA	ADC A0	GP26	GP20	BTN LEFT	I2C0 SDA	SPI0 RX	UART1 TX
	SPI1 TX	I2C1 SCL	ADC A1	GP27	GP21	BTN RIGHT	I2C0 SCL	SPI0 CSn	UART1 RX
UART0 TX	SPI1 RX	I2C0 SDA	ADC A2	GP28	GP22	BTN UP	I2C1 SDA	SPI0 RX	
UART0 RX	SPI1 CSn	I2C0 SCL	ADC A3	GP29	GP23	BTN DOWN	I2C1 SCL	SPI0 TX	
			SDA		GP24		I2C0 SDA	SPI1 RX	UART1 TX
			SCL		GP25	LED	I2C0 SCL	SPI1 CSn	UART1 RX
			5V						
			GND						
			3V3						

Default data communication channels;

- **UART0:** GP0 (TX) ve GP1 (RX)
- **UART1:** GP8 (TX) ve GP9 (RX)
- **I2C0:** GP4 (SDA) ve GP5 (SCL)
- **I2C1:** GP6 (SDA) ve GP6 (SCL)
- **SPI0:** GP16 (RX), GP17 (CSn), GP18 (SCK) ve GP19 (TX)
- **SPI1:** GP10 (SCK), GP11 (TX), GP12 (RX) ve GP13 (CSn)

### DID YOU KNOW?

*Akana is the goddess who inspires creation in ancient Turkish mythology.*

The **analog input** pins of the RP2040, namely GP26, GP27, GP28, and GP29, can also be used as digital inputs or outputs when needed; however, these **ADC** pins cannot be reassigned to other pins.

**WARNING:** It is important **not to use** pins GP4, GP5, GP6, and GP7, which correspond to the I2C0 and I2C1 channels selected by the I2C selector switch for the OLED display, as well as pins GP14, GP15, GP20, GP21, GP22, and GP23, which are connected to the user buttons on the Akana R1. Additionally, changing the default I2C pins in the code will **prevent the use of the OLED display** on the Akana R1.

## AKANAPORT FUNCTION TABLE

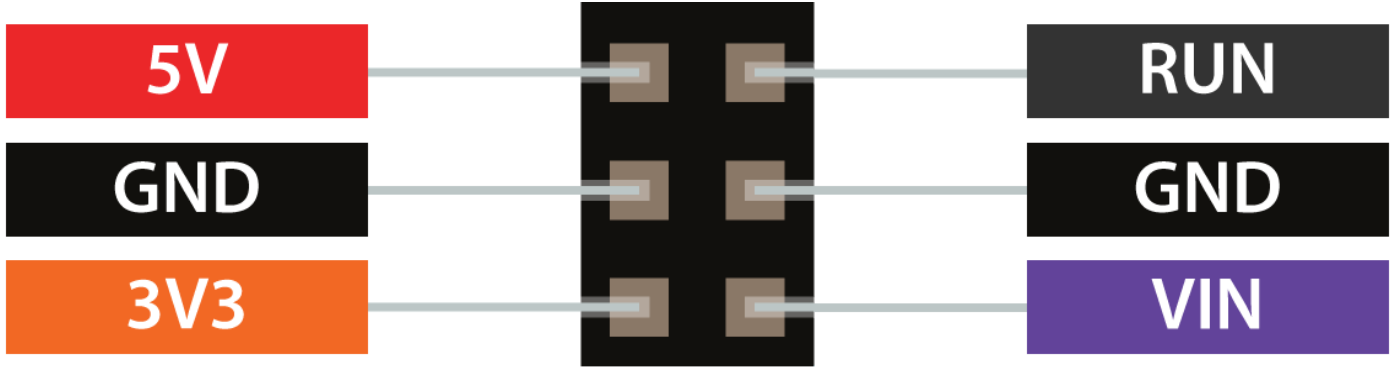
Pin	Type	Function	Description
GP0	Digital I/O	UART0 TX	TX connection of UART0; can be used as a GPIO
GP1	Digital I/O	UART0 RX	RX connection of UART0; can be used as a GPIO
GP2	Digital I/O	GPIO	GPIO pin
GP3	Digital I/O	GPIO	GPIO pin
GP4	Digital I/O	I2C0 SDA	Default I2C0 SDA pin; <b>Should be reserved for I2C devices</b>
GP5	Digital I/O	I2C0 SCL	Default I2C0 SCL pin; <b>Should be reserved for I2C devices</b>
GP6	Digital I/O	I2C1 SDA	Default I2C1 SDA pin; <b>Should be reserved for I2C devices</b>
GP7	Digital I/O	I2C1 SCL	Default I2C1 SCL pin; <b>Should be reserved for I2C devices</b>
GP8	Digital I/O	UART1 TX	TX connection of UART1; can be used as a GPIO
GP9	Digital I/O	UART1 RX	RX connection of UART1; can be used as a GPIO
GND	Power	Ground	Ground connection
GP26	Analog Input	A0	Analog input number 0; can be used as a GPIO
GP27	Analog Input	A1	Analog input number 1; can be used as a GPIO
GP28	Analog Input	A2	Analog input number 2; can be used as a GPIO
GP29	Analog Input	A3	Analog input number 3; can be used as a GPIO
SDA		Selected I2C SDA	SDA pin of the I2C channel selected by the I2C selector
SCL		Selected I2C SCL	SCL pin of the I2C channel selected by the I2C selector
5V	Power	5 Volt	5V regulated from the USB or received from the VIN input
GND	Power	Ground	Ground connection
3V3	Power	3.3 Volt	3.3 Volt regulator output; the main power line of the Akana R1

Pin	Type	Function	Description
GP10	Digital I/O	SPI1 SCK	Default SPI1 channel; can be used as a GPIO
GP11	Digital I/O	SPI1 TX	Default SPI1 channel; can be used as a GPIO
GP12	Digital I/O	SPI1 RX	Default SPI1 channel; can be used as a GPIO
GP13	Digital I/O	SPI1 CSn	Default SPI1 channel; can be used as a GPIO
GP14	Digital I/O	BTN_ENTER	ENTER button pin; <b>should be avoided</b>
GP15	Digital I/O	BTN_BACK	BACK button pin; <b>should be avoided</b>
GP16	Digital I/O	SPI0 RX	Default SPI0 channel; can be used as a GPIO
GP17	Digital I/O	SPI0 CSn	Default SPI0 channel; can be used as a GPIO
GP18	Digital I/O	SPI0 SCK	Default SPI0 channel; can be used as a GPIO
GP19	Digital I/O	SPI0 TX	Default SPI0 channel; can be used as a GPIO
GND	Power	Ground	Ground connection
GP20	Digital I/O	BTN_LEFT	LEFT button pin; <b>should be avoided</b>
GP21	Digital I/O	BTN_RIGHT	RIGHT button pin; <b>should be avoided</b>
GP22	Digital I/O	BTN_UP	UP button pin; <b>should be avoided</b>
GP23	Digital I/O	BTN_DOWN	DOWN button pin; <b>should be avoided</b>
GP24	Digital I/O	GPIO	GPIO pin
GP25	Digital I/O	LED	Onboard user LED pin; can be used as a GPIO
RUN	System	RESET	RP2040 reset pin
GND	Power	Ground	Ground connection
VIN	Power	External Power	Maximum power input of up to 14 volts



## ELECTRICAL CHARACTERISTICS AND LIMITS

The RP2040 microcontroller on which the Akana R1 is built operates at a **3.3 Volt logic level**. Therefore, sensors, modules, or other electronic circuits used with the Akana R1 should be selected to operate at 3.3 Volts.

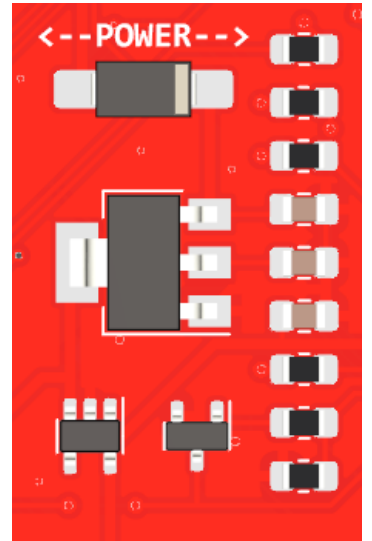


The entire design of the Akana R1 is based on a **3.3 Volt** foundation, and every component on the board operates at this voltage. The **3.3 Volt regulator** (AP2112K-3.3TRG1) on the board uses the voltage supplied through the 5 Volt regulator connected to the USB or VIN input to power all components that operate at 3.3 Volts, primarily the RP2040 microcontroller and the OLED screen.

To enable the use of components that require 5 Volts, such as **WS2812** series addressable LEDs or **micro servo** motors, the Akana R1 also features a 5 Volt output. This 5 Volt output is provided by the **5 Volt regulator** (AMS1117-5.0) connected either through the USB line or the VIN input on the AkanaPort.

The electrical values of the power components and the power pins on the AkanaPort are as follows:

- **RP2040 GPIO voltage:** Maximum 3.5 Volts
- **Onboard OLED display:** Maximum 3.5 Volts
- **AkanaPort 5V supply:** Maximum 5.5 Volts
- **AkanaPort 3.3V supply:** Maximum 3.5 Volts
- **AkanaPort VIN supply:** Maximum 14 Volts



To power the Akana R1 with a single-cell Li-Ion or Li-Po battery, the **5V** supply input should be used. These types of batteries provide a voltage between 3.7 and 4.2 volts when fully charged, which is sufficient for the onboard 3.3V regulator to produce the required voltage. For operating the Akana R1 with a two or more cell battery, the **VIN** (Voltage In) pin should be used.

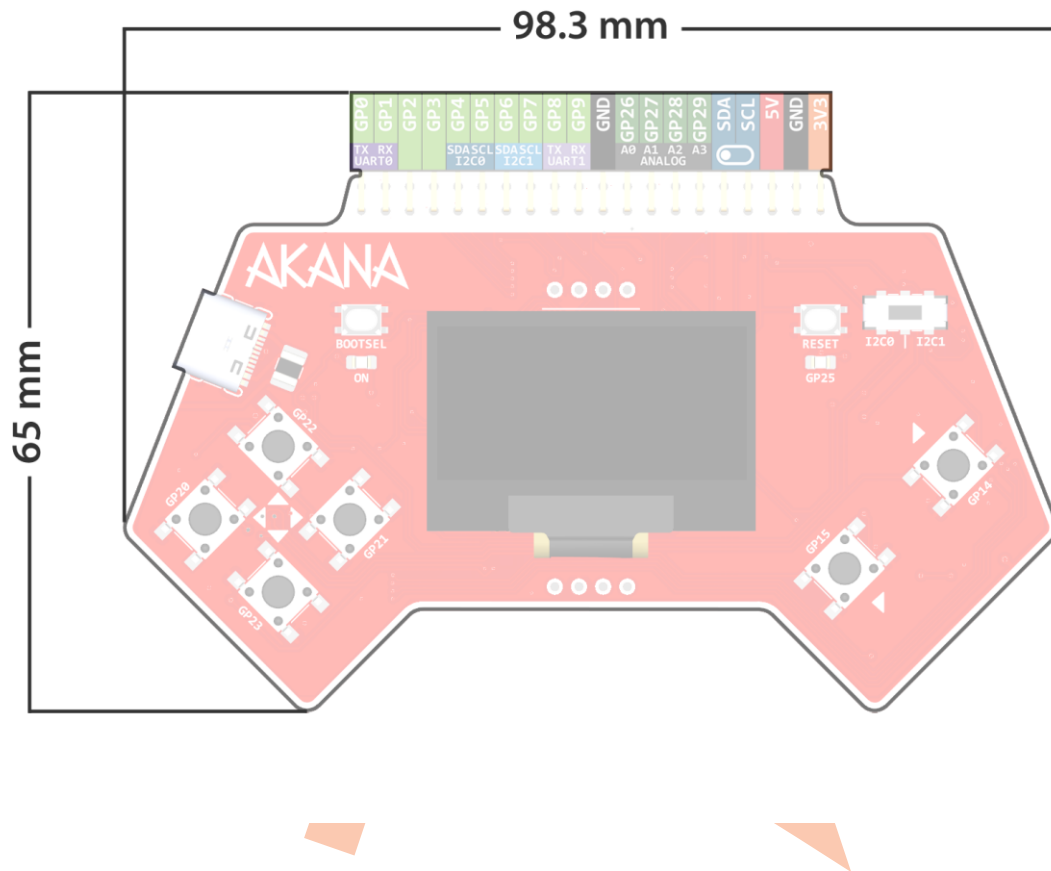
### DID YOU KNOW?

*The Akana R1 design is inspired by the Anatolian **ram's horn** carpet motif.*

The VIN input on AkanaPort is protected against reverse polarity with a **Schottky diode**. However, there is no such protection on the 5V and 3.3V lines, so it is crucial to be very careful when powering the board through these lines.

## DIMENSIONS

METE HOCA Akana R1 measures **98.3 mm x 65 mm x 9 mm** (L/W/H).





## VERSIONS

### METE HOCA Akana R1 Versions

Date	Changes
19 May 2024	Initial version; Akana R1 v1.0

### Document Versions

Date	Changes
19 May 2024	Initial release

