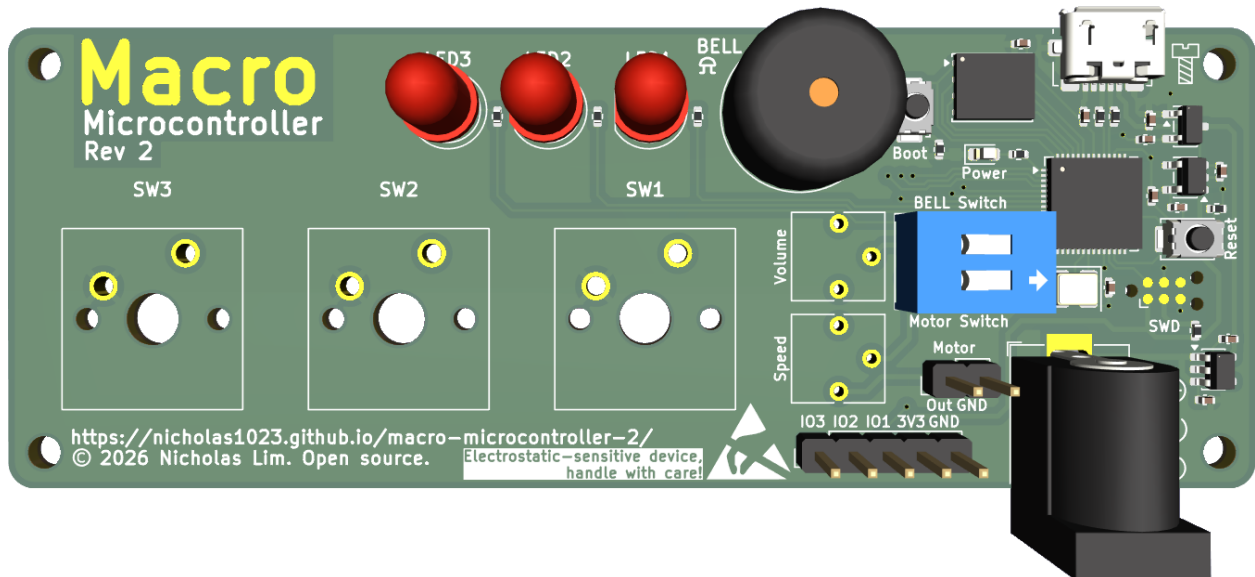


# Macro Microcontroller 2 Datasheet



## Overview

Macro Microcontroller 2 is a macropad + microcontroller development board which controls GPIO pin output using keys with a custom BASIC interpreter firmware.

## Specifications

Microcontroller Unit: RP2040

Power: 5V input via data port or barrel jack, 3.3V input via GPIO pin headers, maximum logic voltage is 3.3V.

Dimensions: 96.52 × 35.56 mm

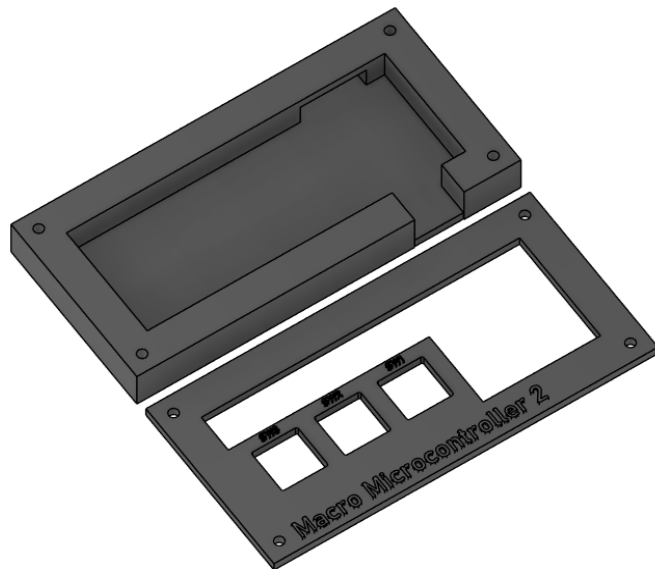
Flash Memory: 4 MiB

Mounting Hole Dimensions: 2.5mm diameter

## Warnings

Components may be damaged if the logic voltage applied is more than 3.3V or more than one power source is used at the same time. Use only one power source, either via the data port, barrel jack or GPIO pin header to power the board. It is safe to use 5V via the data port and barrel jack as low dropout regulators are connected to reduce the voltage to 3.3V. This is an electrostatic-sensitive device. Hold the board by the sides and do not handle with wet hands or while the board is powered.

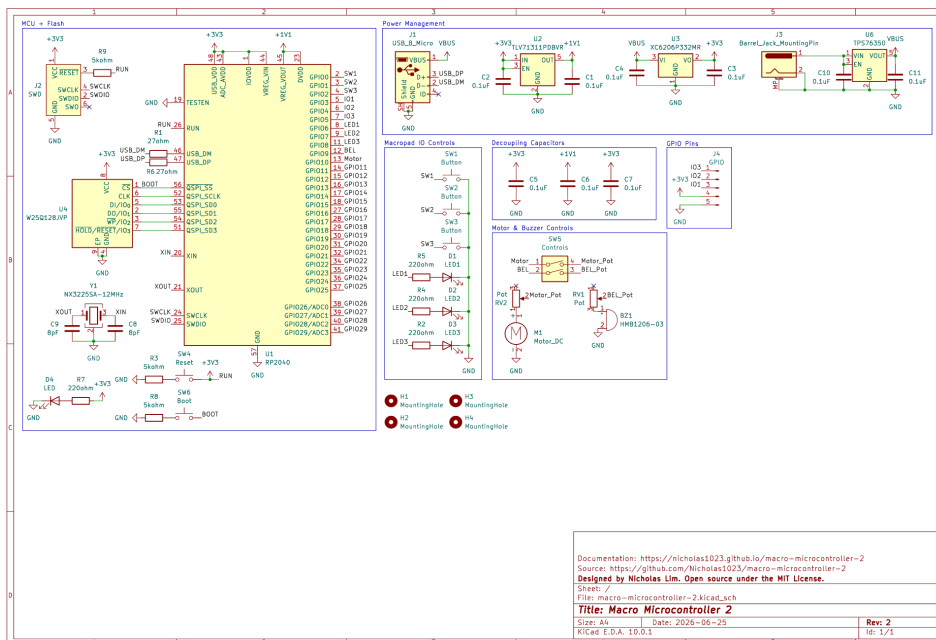
# Enclosure



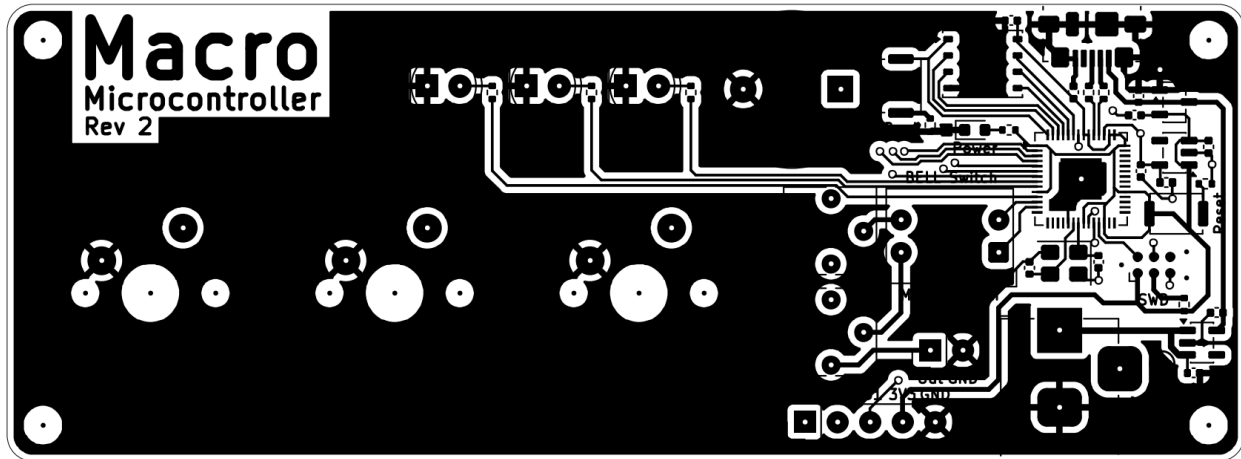
This enclosure is 3D-printable and is available for download from

<https://github.com/Nicholas1023/macro-microcontroller-2/releases/download/v0.0.1/macro-microcontroller-2-enclosure.stl>

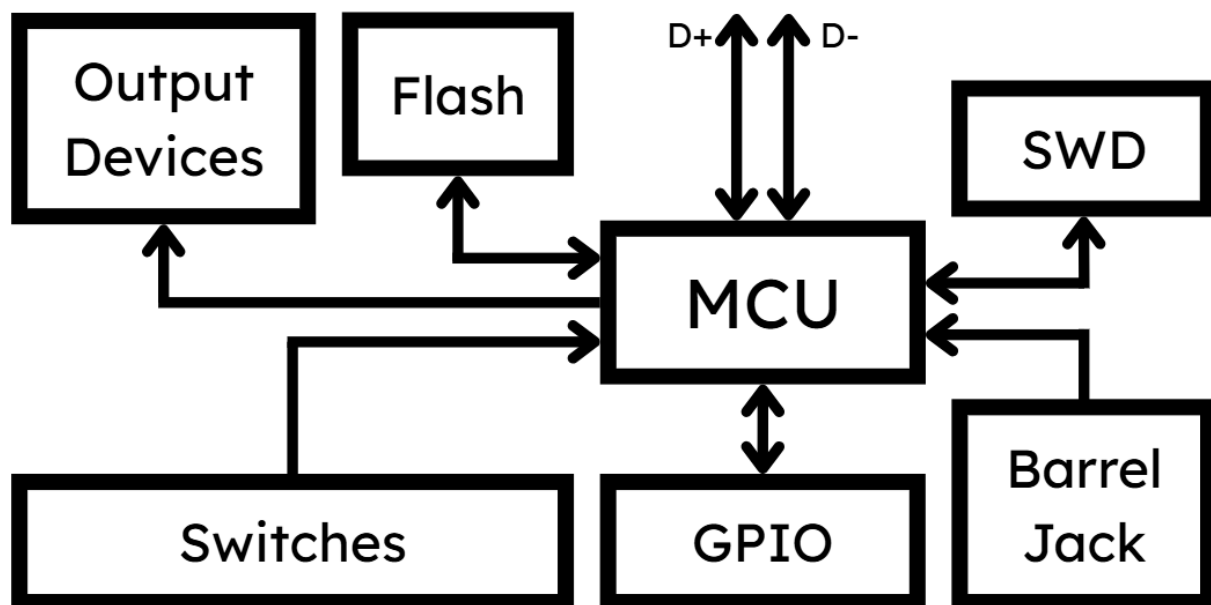
# Schematics



## PCB Routing and Layout



## Block Diagram



## Pinout

Macro Microcontroller 2 provides a few IO pinouts for connecting peripherals.

- DC Motor (MOTOR)
- 2.54mm GPIO pin headers (IO3, IO2, IO1, 3.3V, GND)

| Macro Microcontroller 2 Pin # | Corresponding RP2040 Pin # |
|-------------------------------|----------------------------|
| IO1                           | GPIO3                      |
| IO2                           | GPIO4                      |
| IO3                           | GPIO5                      |

## Built-in IO Devices

- Key switches (SW1, SW2, SW3)
- LEDs (LED1, LED2, LED3)
- Buzzer (BELL)

## Bill of Materials

| Qty | Reference Designator                 | Manufacturer Part # |
|-----|--------------------------------------|---------------------|
| 1   | BZ1                                  | HMB1206-03          |
| 1   | J3                                   | DC-005 2.0          |
| 1   | SW5                                  | DS-02RP             |
| 1   | M1                                   | 2.54 1x2 Pin Header |
| 1   | J4                                   | 2.54 1x5 Pin Header |
| 1   | J1                                   | 473460001           |
| 9   | C1, C10, C11, C2, C3, C4, C5, C6, C7 | 0.1μF 0402          |
| 1   | U1                                   | RP2040              |
| 1   | U3                                   | XC6206P332MR        |
| 1   | U2                                   | TLV71311PDBVR       |
| 4   | R2, R4, R5, R7                       | 220Ω 0402           |
| 1   | D4                                   | NCD0603B1           |
| 2   | C8, C9                               | 8pF 0402            |
| 1   | U4                                   | W25Q128JVPIQ        |

|   |               |                          |
|---|---------------|--------------------------|
| 3 | D1, D2, D3    | 333-2SURD/S530-A3        |
| 1 | U6            | TPS76350DBVR             |
| 1 | Y1            | NX3225SA-12MHz-STD-CSR-6 |
| 2 | R1, R6        | 27 $\Omega$ 0402         |
| 3 | R3, R8, R9    | 5k $\Omega$ 0402         |
| 2 | RV1, RV2      | T73YP202KT20             |
| 3 | SW1, SW2, SW3 | MX1A-E1NA                |
| 2 | SW4, SW6      | SKRKAEE020               |

## Macro Microcontroller BASIC

Macro Microcontroller BASIC is a custom BASIC interpreter written in C with low-level hardware communication, providing a programming environment via a serial terminal.

### Installation

1. Download [macro-microcontroller-basic-0.0.3.uf2](#). SHA-256 Checksum:  
96d4aa58d61d796067c1668cc37896fa968a55dceea188e50f26e067d116e99f
2. Plug in Macro Microcontroller 2 while holding the Boot button. A storage drive will appear on your computer.
3. Move macro-microcontroller-basic-0.0.3.uf2 into the storage drive. Your development board is now running Macro Microcontroller BASIC.
4. Install a serial terminal application on your computer and connect it to the board. If successful, you should see the following:  

```
Macro Microcontroller BASIC Version 0.0.3.  
Copyright (C) 2025-2026 Nicholas Lim.  
***** bytes of RAM free.  
Ready.  
10
```
5. If not, try sending `PRINT "It works!"`. If "It works!" is sent back to the serial terminal, you have successfully installed Macro Microcontroller BASIC.

### Statements

- `PRINT`: Outputs text to the serial terminal.
- `LET`: Assigns a value (integer, float or string) to a variable.

- **INPUT:** Assigns a value (integer, float or string) to a variable via user input.
- **GPIO:** Turns on a specified GPIO pin for 1 second.
- **LSVAR:** Outputs variable name and their value to the serial terminal.
- **END:** Clears variable and reset line numbers.
- **EXIT:** Puts the device into sleep/power off mode.
- **KEY:** Pass GPIO controls to the macropad.
- **REM:** Add comments to your program.

## Predefined Values

- **IO\*:** Set GPIO pins 1, 2 or 3 to high.
- **LED\*:** Set LEDs 1, 2 or 3 to high.
- **BELL:** Sounds the builtin buzzer.
- **MOTOR:** Sets motor pins to high.
- **RND:** Generates a random floating-point integer less than 1.

For more information on Macro Microcontroller 2, visit:

<https://github.com/Nicholas1023/macro-microcontroller-2> (Repository)

<https://nicholas1023.github.io/macro-microcontroller-2> (Documentation site)

## Legal

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