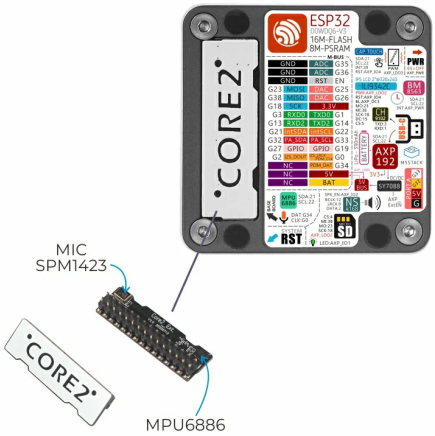
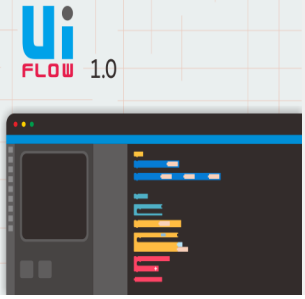
M5Core2

SKU:K010



Tutorial



UIFlow

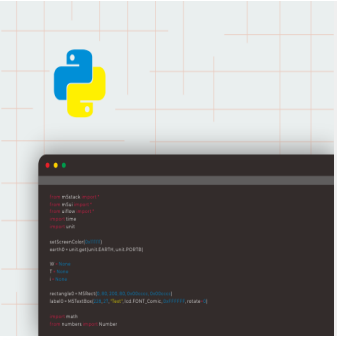
This tutorial will show you how to control M5Core2 devices through the UIFlow graphical programming platform

UIFlow2.0

This tutorial will show you how to control the M5Core2 device through the UIFlow2.0 graphical programming platform

Arduino IDE

This tutorial will show you how to program and control M5Core2 devices through Arduino IDE



Micropython

This tutorial will show you how to control M5Core2 devices through Micropython programming

Caution:

This product contains batteries that are non-replaceable

Description

M5Core2 is the second generation core device in the M5Stack development kit series, which further enhances the functions of the original generation of cores.

The MCU is an ESP32 model D0WDQ6-V3 and has dual core Xtensa® 32-bit 240Mhz LX6 processors that can be controlled separately. Wi-Fi are supported as standard and it includes an on board 16MB Flash and 8MB PSRAM, USB TYPE-C interface for charging, downloading of programs and serial communication, a 2.0-inch integrated capacitive touch screen, and a built-in vibration motor.

M5Core2 also features a built-in RTC module which can provide accurate timing. The power supply is managed by an AXP192 power management chip, which can effectively control the power consumption of the base and a built-in green LED power indicator helps to notify the user of battery level. The battery capacity has been upgraded to 390mAh, which can power the core for much longer than the previous model.

The M5Core2 retains the TF-card(microSD) slot and speakers. However, in order to ensure higher quality sound output, the I2S digital audio interface power amplifier chip is used to effectively prevent signal distortion. There are independent power and reset buttons on the left side and bottom of the base.

The 3 icons on the front of the screen are capacitive buttons which are programmable. There is a small expansion board on the back of the base with a 6-axis IMU sensor and microphone. The development platform and programming language supported by M5Stack Core2: Arduino, UIFlow (using Blockly, MicroPython language) No matter what level of your development and programming skills, M5Stack will help You gradually turn your ideas into reality.

Power Management

Operations:

Power on: One click the power button on the left

Power off: Long press the left power button for 6 seconds

Reset: Click the RST button on the bottom side

USB drive

Before using, please go to download page to download the USB driver that matches your operating system, and install it.
Note: **Core2** currently has two CP2104/CH9102F A USB chip version, users can install the drivers (`CH9102` and `CP210x`) that are compatible with two ICs at the same time to ensure that the device drivers work normally.

Extensions

To stack M5Core2 with M5 modules, you need to remove/eliminate the battery bottom of Core2; If you wish to keep I2S Mic, IMU and Battery functions, a M5GO Bottom2 is required.

The vibration sensor of M5Core2 and M5 Base series are incompatible in mechanical design. Please do not stack them together.

Some of the screen edges will have touch non-linearity problem, you can try to use M5Tool to upgrade the screen firmware to solve this problem.

This product contains batteries that are non-replaceable.

Product Features

- ESP32-based, built-in Wi-Fi
- 16M Flash,8M PSRAM
- Built-in speaker, power indicator, vibration motor, RTC, I2S amplifier, capacitive touch screen, power button, reset button
- TF card slot (16G Maximum size)
- Built-in lithium battery, equipped with power management chip
- Independent small board built-in 6-axis IMU, PDM microphone
- M-Bus Socket & Pins
- Compatible with multi-platform development:
  - UIFlow
  - MicroPython
  - Arduino
  - .NET nanoFramework
  - Operating System (RTOS):zephyr

Include

- 1x M5Stack Core2
- 1x Type-C USB(20cm)
- 1x HEX KEY

Applications

- Internet of things terminal controller
- Stem education product
- DIY creation
- Smart home equipment

Specification

Resources	Parameter

Resources	Parameter
ESP32-D0WDQ6-V3	240MHz dual core, 600 DMIPS, 520KB SRAM, Wi-Fi
Flash	16MB
PSRAM	8MB
Input Voltage	5V @ 500mA
Interface	TypeC x 1, GROVE(I2C+I/0+UART) x 1
IPS LCD Screen	2.0"@320*240 ILI9342C
Touch Screen	FT6336U
Speaker	1W-092
LED	Green power indicator light
Button	Power button, RST button, Virtual screen button*3
Vibration reminder	Vibration motor
MIC	SPM1423
I2S Power Amplifier	NS4168
6-axis IMU	MPU6886
RTC	BM8563
PMU	AXP192
USB Chip	CP2104/CH9102F (two chip versions, there is no difference in function and use)
DC-DC Boost	SY7088

Resources Parameter

TF card slot	16G Max
Lithium Battery	500mAh @ 3.7V
Antenna	2.4G 3D antenna
Operating temperature	0°C to 60°C
Base screw specifications	Hexagon socket countersunk head M3
Internal PCB board reserved interface	Battery interface (specification: 1.25mm-2P) USB line interface (specification: 1.25mm-4P)
Net Weight	52g
Gross Weight	76g
Product Size	54 x 54 x 16.5mm
Package Size	75 x 60 x 20mm
Case Material	Plastic (PC)

Driver Installation

Click the link below to download the driver that matches the operating system. There are currently two driver chip versions, CP210X (for `CP2104` version)/CP34X (for `CH9102` version) driver compressed package. After decompressing the compressed package, select the installation package corresponding to the number of operating systems to install. (If you are not sure of the USB chip used by your device, you can install both drivers at the same time. During the installation process of `CH9102_VCP_SER_MacOS v1.7` , an error may occur, but the installation is actually completed, just ignore it.) When using it, if If the program cannot be downloaded normally (the prompt is overtime or Failed to write to target RAM), you can try to reinstall the device driver.

Driver name	Applicable driver chip	Download link
CP210x_VCP_Windows	CP2104	Download
CP210x_VCP_MacOS	CP2104	Download
CP210x_VCP_Linux	CP2104	Download
CH9102_VCP_SER_Windows	CH9102	Download
CH9102_VCP_SER_MacOS v1.7	CH9102	Download

Port Selection on MacOS

On MacOS, there may be two available ports. When using them, please select the port named wchmodem.

EasyLoader

EasyLoader is a concise and fast program writer, which has a built-in case program related to the product. It can be burned to the main control by simple steps to perform a series of function verification.

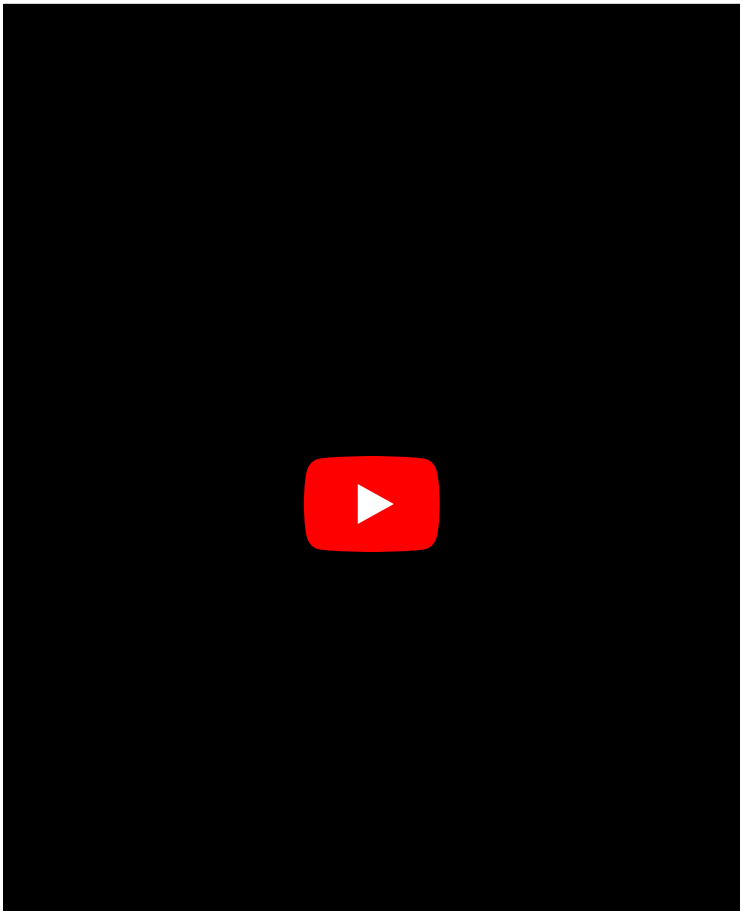
Download Windows Version Easyloader

Download MacOS Version Easyloader

CORE2 .mp4

Description:

This case will perform hardware running tests for speakers, wifi, buttons, accelerometer, TF-card(microSD), screen, etc.



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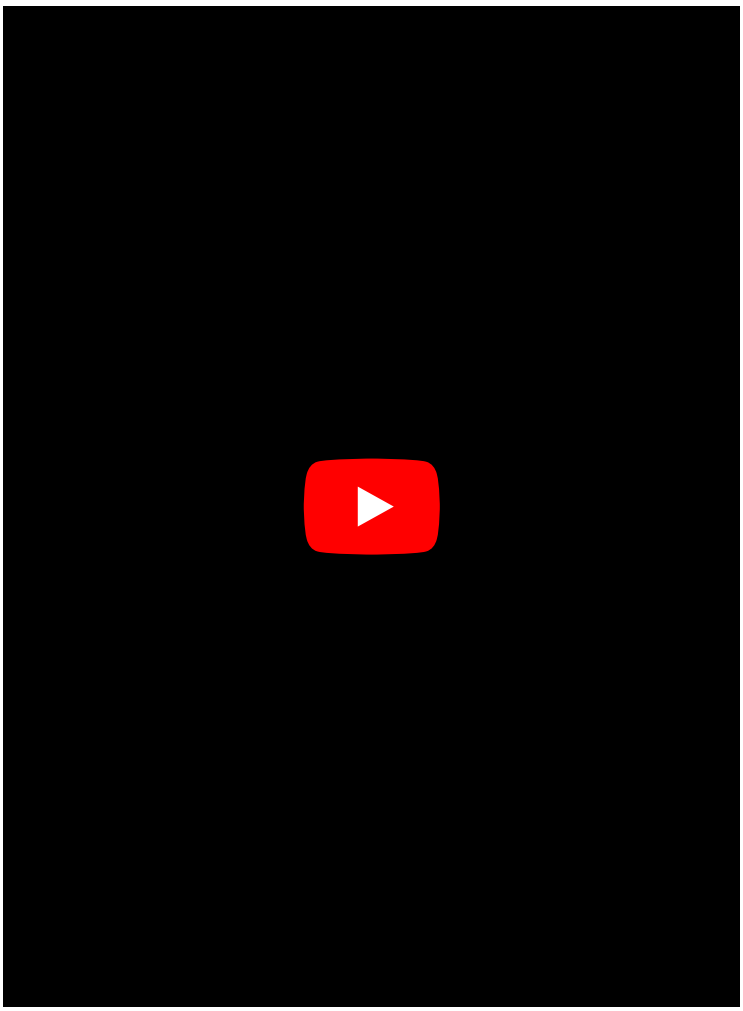


PinMap

LCD & TF card

LCD :320x240 TF card Maximum size 16GB

ESP32 Chip	GPIO38	GPIO23	GPIO18	GPIO5	GPIO15		
AXP192 Chip						AXP_IO4	A
ILI9342C	MISO	MOSI	SCK	CS	DC	RST	

ESP32 Chip	GPIO38	GPIO23	GPIO18	GPIO4
TF Card	MISO	MOSI	SCK	CS

CAP.TOUCH (I2C Addr: 0x38)

ESP32 chip	GPIO21	GPIO22	GPIO39	
AXP192				AXP_IO4
FT6336U	SDA	SCL	INT	RST

Mic & NS4168(Speaker)

ESP32 Chip	GPIO12	GPIO0	GPIO2	AXP_IO2	GPIO34
NS4168	BCLK	LRCK	DATA	SPK_EN	
Mic		CLK			DATA

AXP Power Indicator Light

AXP192	AXP_IO1	AXP_LDO3
Green LED	Vcc	
Vibration motor		Vcc

RTC

ESP32 Chip	GPIO21	GPIO22	
AXP192			AXP_PWR
BM8563	SDA	SCL	INT

IMU(3-axis gyroscope & 3-axis accelerometer)

ESP32 Chip	GPIO21	GPIO22
MPU6886	SDA	SCL

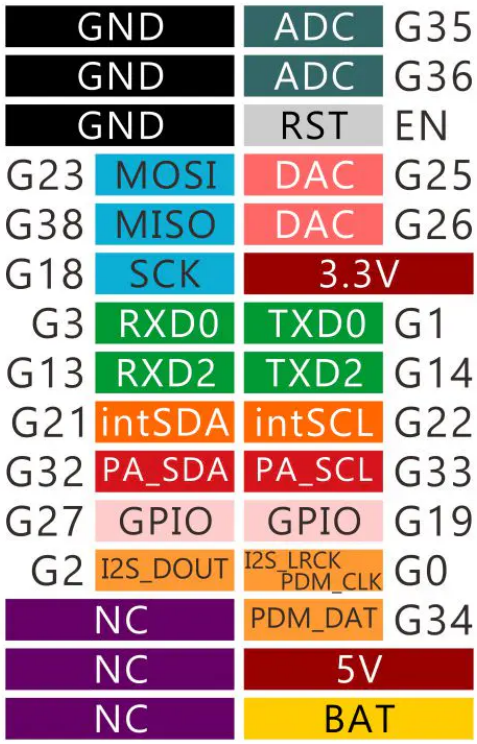
USB to serial chip

ESP32 Chip	GPIO1	GPIO3
CP2104/CH9102F	RXD	TXD

Internal I2C connection

ESP32 Chip	GPIO21	GPIO22
MPU6886	SDA	SCL
AXP192	SDA	SCL
BM8563	SDA	SCL
FT6336U	SDA	SCL

M5Core2 M-BUS Schematic diagram



M5Core2 BUS(compared to M5Stack)

M5PORT DEFINE

PORT	PIN	Note:
PORT-A(Red)	32/33	I2C
PORT-B(Black)	26/36	DAC/AD
PORT-C(Blue)	13/14	UART

ESP32 ADC/DAC

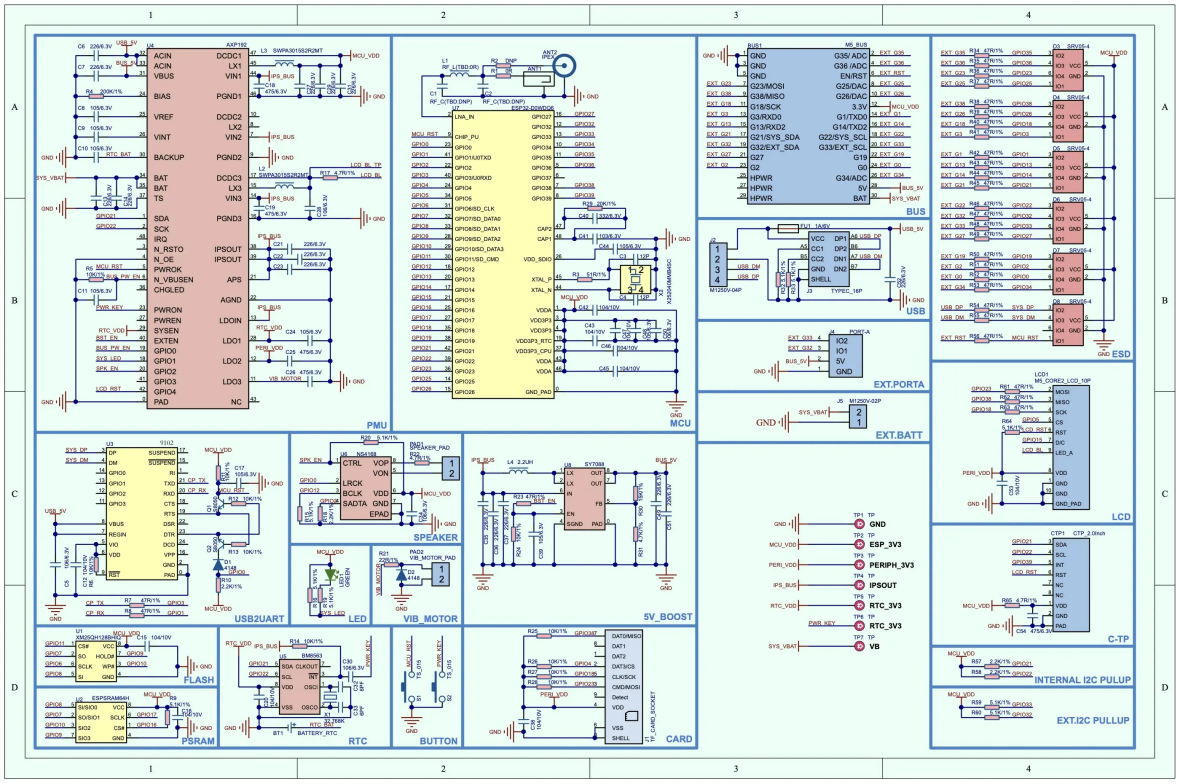
ADC1	ADC2	DAC1	DAC2
8 channels	10 channels	2 channels	2 channels
G32-39	G0/2/4/12-15/25-27	G25	G26

For more information about Pin assignment and Pin Remapping, Please refer to ESP32 Datasheet

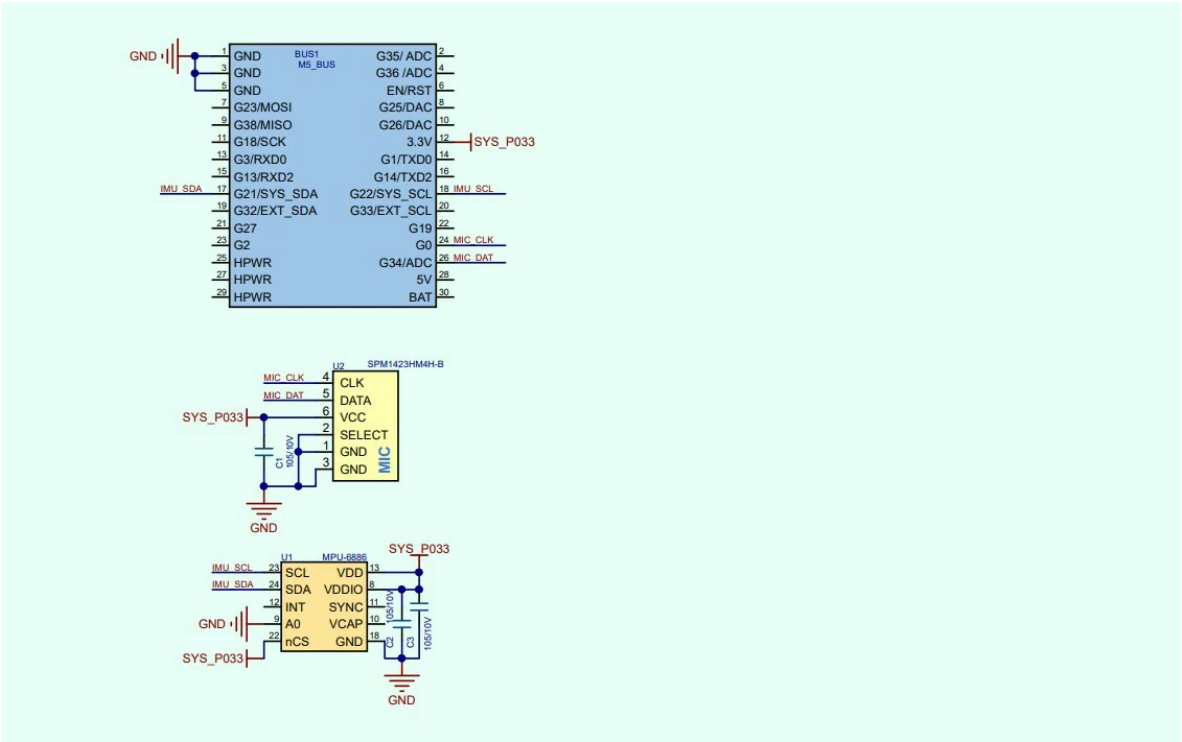
Charging current measured value

charging current	Fully charged current(Power OFF)	Fully charged current(Power ON)
0.219A	0.055A	0.147A

Schematic

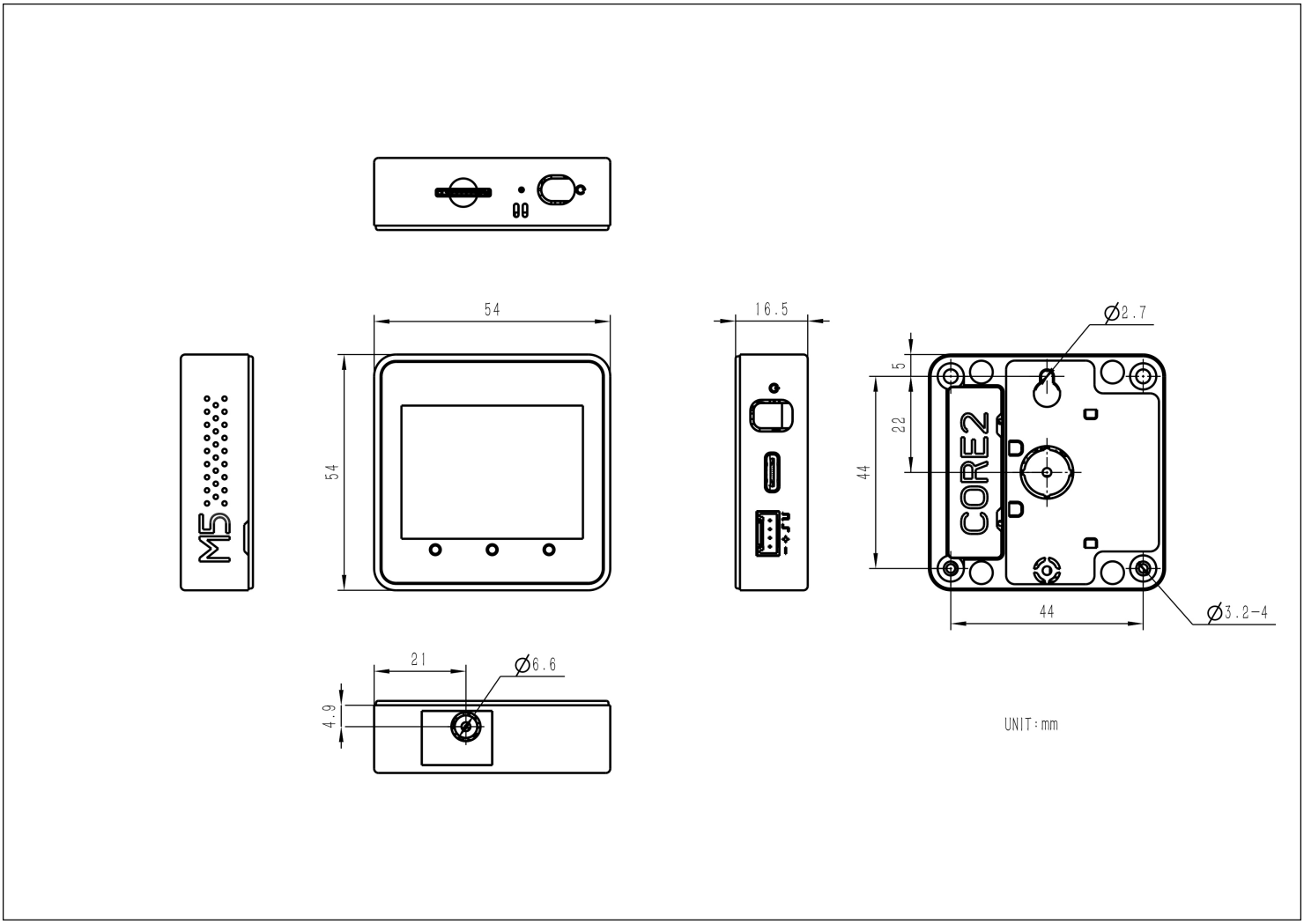


- Core2-Schematic



- Core2 Expansion board-Schematic

Product Size



Related Link

- **Datasheet**
  - ESP32
  - FT6336U
  - NS4168
  - MPU6886
  - ILI9342C
  - SPM1423
  - BM8563
  - SY7088
  - AXP192 datasheet

- AXP192 register
- 1027DC Motor

- **API**
  - Arduino API

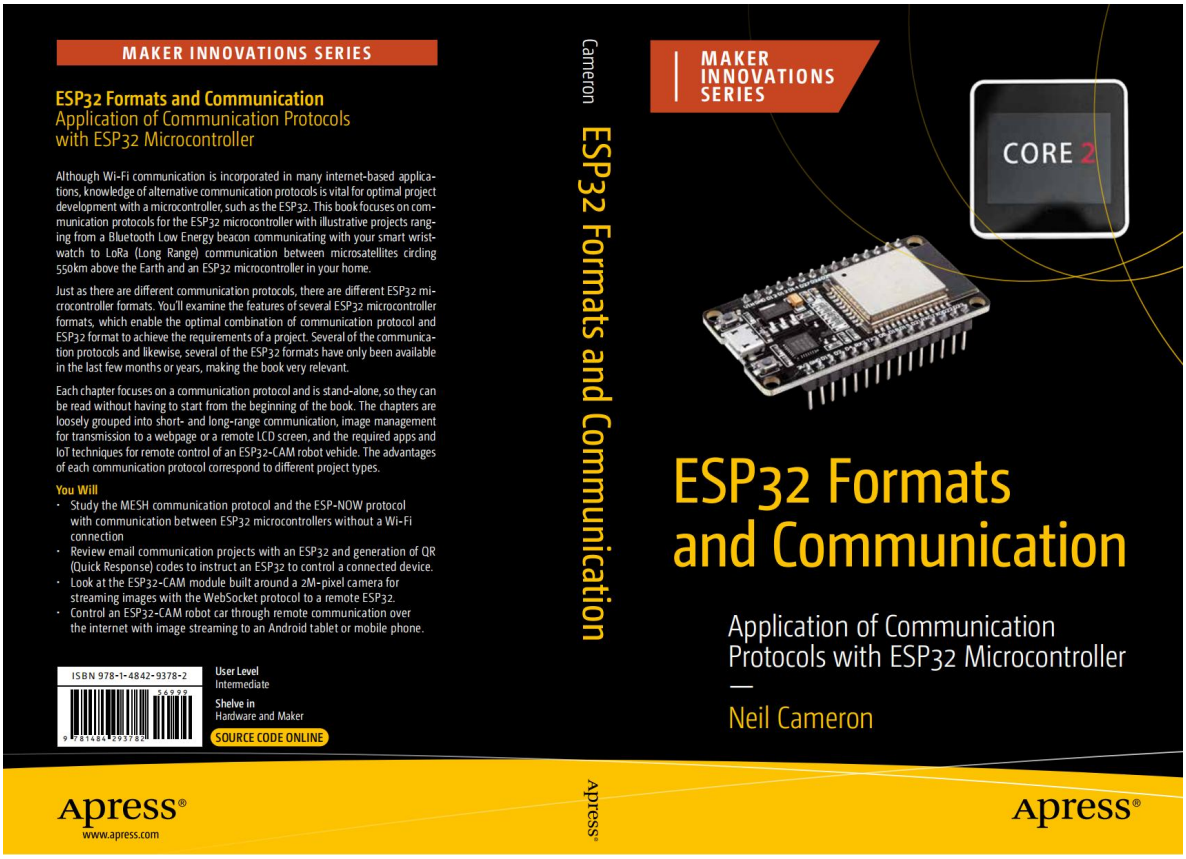
Example

Arduino

- M5Core2 Arduino Library

Tutorial

- UIFlow
- Arduino
- ESP32 formats and communication protocols



> The book " ESP32 formats and communication protocols " features the M5Stack Core2 module in several Chapters. The M5Stack Core2 module incorporates a touch LCD screen, Bluetooth and Wi-Fi communication, a microphone and speaker, as well as an accelerometer and gyroscope, making the M5Stack Core2 module extremely versatile. The book build projects using communication protocols ranging from those connecting your smart watch to your mobile phone (BLE) to long range communication with satellites circling above the Earth (LoRa) and transmission of audio signals between devices (I2S). QR codes are used to control external devices over the internet, while the ESP-MESH and ESP-NOW protocols enable communication between microcontrollers without an internet connection.

Version Change

Release Date	Product Change	Note:
2020.6	Initial public release<	/
2021.7	USB Chip changed from CP2104 to CH9102F	The actual delivery has two chip versions, CP2104/CH9102F, and there is no difference in function and use
2023.27	Cancel RTC coin cell batteries	Does not affect the timing function
2023.10	Lithium battery capacity changed to 500mAh	/

FAQ

Q: If the memory card fails to read, you can add the following code in the initialization to increase the host memory card

```
for (auto gpio : (const uint8_t[]){18, 19, 23}) {
   *(volatile uint32_t*)(GPIO_PIN_MUX_REG[gpio]) |= FUN_DRV_M;
   gpio_pulldown_dis((gpio_num_t)gpio);
   gpio_pullup_en((gpio_num_t)gpio);
 }
```

sdcard_test

```
#include <SPI.h>
#include <SD.h>

#include <soc/gpio_reg.h>
#include <soc/io_mux_reg.h>

void setup() {
  SPI.begin(18, 19, 23);

//  // 对策代码从这里开始
  for (auto gpio : (const uint8_t[]){18, 19, 23}) {
    *(volatile uint32_t*)(GPIO_PIN_MUX_REG[gpio]) |= FUN_DRV_M;
    gpio_pulldown_dis((gpio_num_t)gpio);
    gpio_pullup_en((gpio_num_t)gpio);
  }
//  // 对策代码到此结束

  Serial.begin(115200);
  Serial.println("SD begin.\n");

  while (!SD.begin(4, SPI, 1000)) {
    delay(1024);
    Serial.println(".\n");
  }

  Serial.println("SD done.\n");
}

void loop() {
  delay(1);
}
```

Q: How to detect the power level of core2?

- Upload the following code, refer to core2 API description

```
#include <M5Core2.h>

void setup() {
  M5.begin();
}
void loop() {
  Serial.printf("Bat Voltage:%f\n", M5.Axp.GetBatVoltage());
  delay(500);
}
```

Q: How do I display pictures on CORE2? (Using C language)

- - Create a 320*240 pixel jpg image named logo.jpg.

- Download the source files , unzip them, open the folder, execute .\conver.ps1 in the terminal, and replace the result in the array of the source file below.
- Open the drawImageData_core2_Pure.ino program, and replace the binary result obtained above into the array below.
- Upload the program. The result is as shown in the image below: