



Description

M5Stack GRAY Kit is one of the M5Stack development kit series, which is an upgrade from the Basic kits. In comparison, Gray kit provides an extra IMU sensor, BMM150 + MPU6886. Gray kit is a nice choice for users who just get started or in progress.

With an IMU posture sensor, there are a lot of situations which you can apply this kit to: detecting acceleration, angulation, and trajectory. You can make relative products like sports data collector, 3D remote gesture controller and more based on the above functions.

GRAY is an M5 Core device. Its modular, stackable, scalable, and portable device is powered with an ESP-32 core, which makes it open source, low cost, full-function, and easy for developers to handle new product development on all stages including circuit design, PCB design, software, mold design and production.

If you want to explore the fastest way of IoT prototyping, M5Stack development board is the perfect solution. Not like others, M5Stack development board is highly efficient, covered with industrial grade case and ESP32-based development board. It integrates with Wi-Fi & Bluetooth modules and contains a dual-core and 16MB of SPI Flash. Together with 30+ M5Stack stackable modules, 40+ extendable units and different levels of program language, you can create and verify your IoT product in a very short time.

Supportive development platforms and programming languages: Arduino, Blockly language with [UIFlow](#), MicroPython. Regardless of what level programming skill you have, M5Stack would guide you in every step of the way to realize your idea as well as to the final productization.

If you ever played with ESP8266, you would realize that ESP32 is a perfect upgrade out of ESP8266. In comparison, ESP32 has more GPIOs, more analog inputs and two analog outputs, multiple extra peripherals (like a spare UART). Official developing platform ESP-IDF has transplanted with FreeRTOS. With dual-core and real-time OS you can get more organized code and much high-speed processor.

Power on/off:

Power on: click the red power button on the left

Power off: Quickly double-click the red power button on the left

Product Features

- ESP32 - based
- Built-in Speaker, Buttons, LCD
- TF card slot (Up to 16GB support)
- Battery Socket & Lipo Battery
- Extendable Pins & Holes
- M-Bus Socket & Pins
- Development Platform [UIFlow](#), [MicroPython](#), [Arduino](#)

Include

- 1x Gray
- 10x Femal - male Dupont
- 1x Type -C USB(20cm)
- 1x User Manual
- 1x Sticker

Applications

- Internet of things terminal controller
- Stem education product
- DIY creation

Specification

Resources	Parameter
ESP32	240MHz dual core, 600 DMIPS, 520KB SRAM, Wi-Fi, dual mode Bluetooth
Flash Memory	16MB (old: 4MB)
Power Input	5V @ 500mA
Port	TypeC x 1, GROVE(I2C+I/O+UART) x 1
IPS Screen	2 inch, 320x240 Colorful TFT LCD, ILI9342C, max brightness 853nit
Speaker	1W-0928
Button	Custom button x 3
Core Bottom Port	PIN (G1, G2, G3, G16, G17, G18, G19, G21, G22, G23, G25, G26, G35, G36)
MEMS	BMM150 + MPU6886
Battery	110mAh @ 3.7V
Antenna	2.4G 3D Antenna
Operating Temperature	32°F to 104°F (0°C to 40°C)
net weight	49.2g
Gross weight	93g
Product Size	54 x 54 x 18.9 mm
Package Size	95 x 65 x 25mm
Case Material	Plastic (PC)

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. Please install the corresponding driver according to the device type. M5Core host [Please click here to view the CP210X driver installation tutorial](#), M5StickC/V/T/ATOM series can be used without driver)

Peripherals Pin Map

LCD & TF card

LCD : 320x240 TF card Maximum size 16GB

ESP32 Chip	GPIO23	GPIO19	GPIO18	GPIO14	GPIO27	GPIO33	GPIO32	GPIO4
ILI9342C	MOSI/MISO	/	CLK	CS	DC	RST	BL	
TF Card	MOSI	MISO	CLK					CS

Button & Speaker

ESP32 Chip	GPIO39	GPIO38	GPIO37	GPIO25
Button	BUTTON A	BUTTON B	BUTTON C	
Speaker				Speaker Pin

GROVE A & IP5306

Power Management IC (IP5306) is customized I2C edition, its I2C address is 0x75. Click [here](#) to check IP5306 datasheet

Button & Speaker

ESP32 Chip	GPIO39	GPIO38	GPIO37	GPIO25
Button Pin	BUTTON A	BUTTON B	BUTTON C	
Speaker				Speaker Pin

GROVE Port A & IP5306

We've use the customized I2C version of IP5306, on power management.

Its I2C address is 0x75. Click [here](#) to check its datasheet

ESP32 Chip	GPIO22	GPIO21	5V	GND
GROVE A	SCL	SDA	5V	GND
IP5306	SCL	SDA	5V	GND

IP5306 charging/discharging, Voltage parameter

charging	discharging
0.00 ~ 7.40V > 0%	< 2.0 ~ 4.07V > 100%

0.00 ~ 3.40V -> 0%	4.20 ~ 4.07V -> 100%
3.40 ~ 3.61V -> 25%	4.07 ~ 3.81V -> 75%
3.61 ~ 3.88V -> 50%	3.81 ~ 3.55V -> 50%
3.88 ~ 4.12V -> 75%	3.55 ~ 3.33V -> 25%
4.12 ~ / > 100%	3.33 ~ 0.00V -> 0%

6-Axis MotionTracking Sensor MPU6886

MPU6886 I2C address 0x68

ESP32 Chip	GPIO22	GPIO21	5V	GND
MPU6886	SCL	SDA	5V	GND

3-Axis Geomagnetic Sensor BMM150

BMM150 I2C address 0x10

ESP32 Chip	GPIO22	GPIO21	5V	GND
BMM150	SCL	SDA	5V	GND

M5PORT EXPLAIN

PORT	PIN	Note:
PORT-A(Red)	G21/22	I2C
PORT-B(Black)	G26/36	DAC/ADC
PORT-C(Blue)	G16/17	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](#)

Schematic

[Schematic](#)

Related Link

Datasheet

- [ESP32](#)
- [MPU6886](#)
- [BMM150](#)
- [IP5306](#)

Example

ArduinoIDE

Click [here](#) to download Arduino code

Version Change

Release Date	Product Change
2017.9	Initial public release
2017.12	MPU6050+MAG3110 changed to MPU9250
2019.6	MPU9250 changed to MPU6886+BMM150
2019.7	TN screen changed to IPS screen
2020.3	Battery capacity changed from 150mAh to 110mAh

Video

