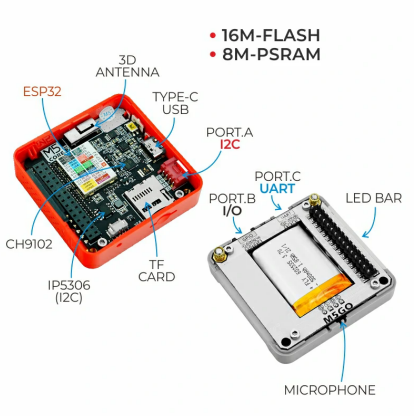
Fire v2.7

SKU:K007-V27



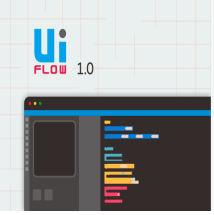
Description

Fire v2.7 is a cost-effective **Wi-Fi** IoT controller. It uses the Espressif **ESP32** main control chip, equipped with 2 low-power **Xtensa® 32-bit LX6** microprocessors, with a main frequency of up to 240 MHz. It has an onboard memory combination of **8M PSRAM** + **16M Flash**, integrating a **2.0-inch full-color high-definition IPS display panel**, **IMU**, **LED**, **microphone**, **speaker**, **TFCard slot**, and other peripherals. The fully covered casing ensures the **stability** of circuit operation even in complex industrial application scenarios. The internal bus provides a variety of commonly used interface resources (ADC/DAC/I2C/UART/SPI, etc.), making it highly expandable. This feature-rich, high-performance IoT controller is very suitable for various product prototype development, industrial control, and smart building application scenarios.

Features

- `Highly Productized`:
  - Exquisite appearance design, directly corresponding to product landing for prototype development
  - Product-grade full-cover casing for more stable circuit operation
- **Low-Code Development**:
  - Supports UIFlow graphical programming platform, scripting, no compilation, cloud push
  - Fully compatible with mainstream development platforms like Arduino, ESP-IDF
  - Supports FreeRTOS, efficiently organizing task logic and optimizing program execution efficiency with dual-core and multitasking mechanisms
- **High Integration**:
  - 2.0-inch IPS display panel, 6-axis IMU, programmable RGB lights x10, microphone, speaker, custom buttons x3
  - Built-in lithium battery power supply, integrated power management chip, supports Type-C interface and POGO PIN interface power supply
  - Professionally modulated RF circuit provides stable and reliable wireless communication quality
- **Strong Expandability**:
  - GROVE expansion ports x3 (I2C, GPIO, UART)
  - Easily integrate into M5Stack's software and hardware ecosystem, stackable module design, plug-and-play sensor expansion

Tutorial



UIFlow

This tutorial will teach you how to control the Fire device through the UIFlow graphical programming platform

UiFlow2

This tutorial will teach you how to control the Fire device through the UiFlow2 graphical programming platform

Arduino IDE

This tutorial will teach you how to program and control the Fire device using the Arduino IDE

Features

- Developed based on ESP32
- 8M PSRAM + 16M FLASH memory combination
- Integrated full-color high-definition IPS display panel and various hardware peripherals
- Rich resource interfaces, compatible with M5Stack stackable module system and sensor system, highly expandable
- Uses M5GO BOTTOM base compatible with 8mm LEGO bricks, making structural building fun.
- Microsoft Azure certified device
- Development Platform
  - UiFlow1
  - UiFlow2
  - Arduino IDE
  - ESP-IDF
  - PlatformIO

Includes

- 1 x M5Stack FIRE
- 1 x M5GO charging base
- 2 x LEGO bricks
- 5 x LEGO connectors
- 1 x M3 hex wrench
- 1 x USB Type-C cable (50cm)
- 1 x User manual

Applications

- IoT controller
- Maker DIY projects
- Smart home control

Specifications

Specification	Parameter
SoC	ESP32-D0WDQ6,240MHz dual core，600 DMIPS，520KB SRAM，Wi-Fi
Flash	16MB
PSRAM	8MB
Input Power	5V @ 500mA
Interface	Type-C x1, POGO PIN x1, I2C x1, GPIO x1, UART x1
Buttons	Physical buttons x 3
LCD Screen	2.0"@320 x 240 ILI9342C IPS panel, max brightness 853nit
Speaker	1W-0928
Microphone	Analog BSE3729 Microphone
IMU	6-axis MPU6886
USB Chip	CH9102F
LED	SK6812 RGB LED x 10
Antenna	2.4G 3D antenna
Battery	500 mAh @ 3.7V
Casing Material	Plastic (PC)
Product Size	54.0 x 54.0 x 28.6mm
Product Weight	88.8g
Package Size	106.7 x 69.1 x 40.4mm
Gross Weight	148.6g

Learn

Power On/Off

Power On/Off Operation

Power On: Single click the red power button on the left

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

USB Power Supply: By default, when USB is powered, it cannot be turned off

Note:

GPIO 16 / 17 in FIRE is connected to PSRAM by default, so when connecting or stacking other functional modules, be careful to avoid conflicts with these two pins to prevent the device from malfunctioning and causing instability.

Schematics

- M5Core Schematics PDF

REV	DESCRIPTION	DATE	BY
A13	OFFICIAL RELEASE VERSION	10/11/2017	Han

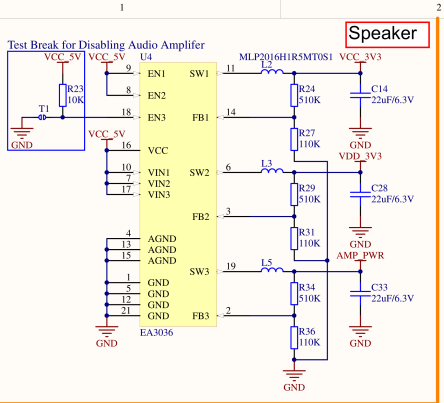
PAGE NO.	SCHEMATIC PAGE
1	COVER PAGE
2	POWER MANAGEMENT
3	ESP32 SUBSYSTEM
4	USB-UART & ACCESSORY
5	M.BUS DEFINATION
6	AUDIO AMPLIFER

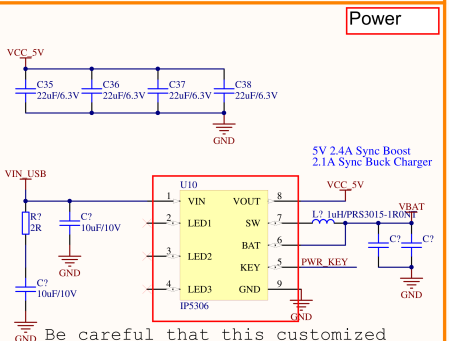
M5 STACK CORE

Title: M5 STACK CORE COVER

Size	Number	Revision
A4	013-0000-001	A

Date:	2017/12/6	Sheet	of
File:	C:\Users\..\A1-COVER.SchDoc	Drawn By:	Han Shihao





Be careful that this customized IP5306 was designed to communication with ESP32 through IIC. IIC address is 0x75.

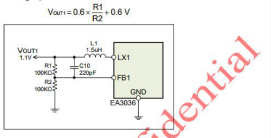
Link for Datasheet: http://198.13.102.98/bj/ingenic_support/X1000_X1000E_X1500/02_HW/00_Halley2/Halley2_coreV3.0_baseV2.0/06Datasheet/PMIC/EA3036_1.0_2014_Sep.pdf

Application Information

Output Voltage Setting

Each of the regulators output voltage can be set via a resistor divider (ex. R1, R2). The output voltage is calculated by following equation:

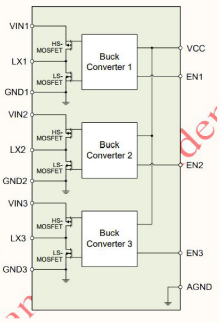
$$V_{OUT1} = 0.6 \times \frac{R1}{R2} + 0.6\ V$$



The following table lists common output voltage and the corresponding R1, R2 resistance value for reference.

Output Voltage	R1 Resistance	R2 Resistance	Tolerance
3.3V	510KΩ	110KΩ	1%
1.8V	200KΩ	100KΩ	1%
1.5V	150KΩ	100KΩ	1%
1.2V	100KΩ	100KΩ	1%

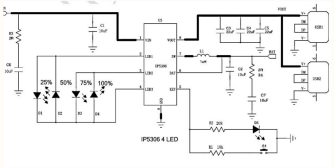
Function Block Diagram



Link for DCDC Buck Inductor: http://www.mouser.com/ds/2/400/nductor_commercial_power_mlp2016_en-838407.pdf

Type		Thickness T (mm)max.	L (μH)	tolerance	Measuring frequency (MHz)	DC resistance (Ω)	Rated current (mA)max.	Part No.
Low core loss	Low resistance	1.0	0.47	±20%	2	0.055±25%	1700	MLP2016HF47MT0S1
		1.0	1.0	±20%	2	0.09±25%	1300	MLP2016H1R0MT0S1
		1.0	1.5	±20%	2	0.11±25%	1200	MLP2016H1R5MT0S1
		1.0	2.2	±20%	2	0.11±25%	1200	MLP2016H2R2MT0S1
		1.0	3.3	±20%	2	0.12±25%	1200	MLP2016H3R3MT0S1
		1.0	4.7	±20%	2	0.16±25%	1100	MLP2016H4R7MT0S1
	Emphasized DC bias characteristics	1.0	0.47	±20%	2	0.07±25%	1500	MLP2016VR47MT0S1
		1.0	1.0	±20%	2	0.12±25%	1200	MLP2016V1R0MT0S1
		1.0	1.5	±20%	2	0.14±25%	1150	MLP2016V1R5MT0S1
		1.0	2.2	±20%	2	0.17±25%	1000	MLP2016V2R2MT0S1

Datasheet for IP5306:
http://www.injoinic.com/doc/IP5306%C2%A0datasheet%C2%A0v1.01.pdf



M5 STACK CORE

Title: M5 STACK CORE POWER MANAGEMENT

Size	Number	Revision
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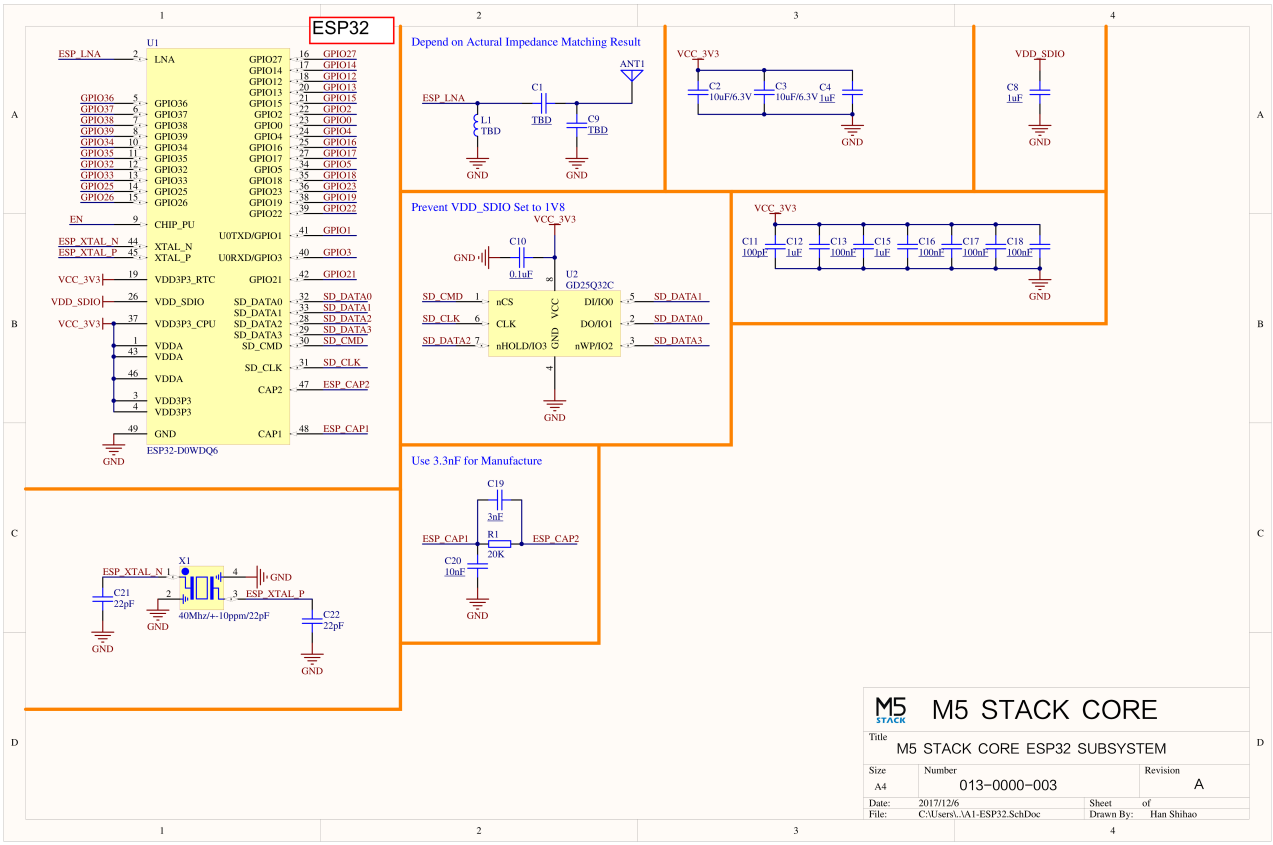
File:	C:\Users\..\A1-PWR.SchDoc	Drawn By:	Han Shihao


ESP32
Depend on Actural Impedance Matching Result
Prevent VDD_SDIO Set to 1V8
Use 3.3nF for Manufacture
ESP32-D0WDQ6
M5 STACK CORE
M5 STACK CORE ESP32 SUBSYSTEM
Size A4
Number 013-0000-003
Revision A
Date: 2017/12/6
File: C:\Users\..\A1-ESP32.SchDoc
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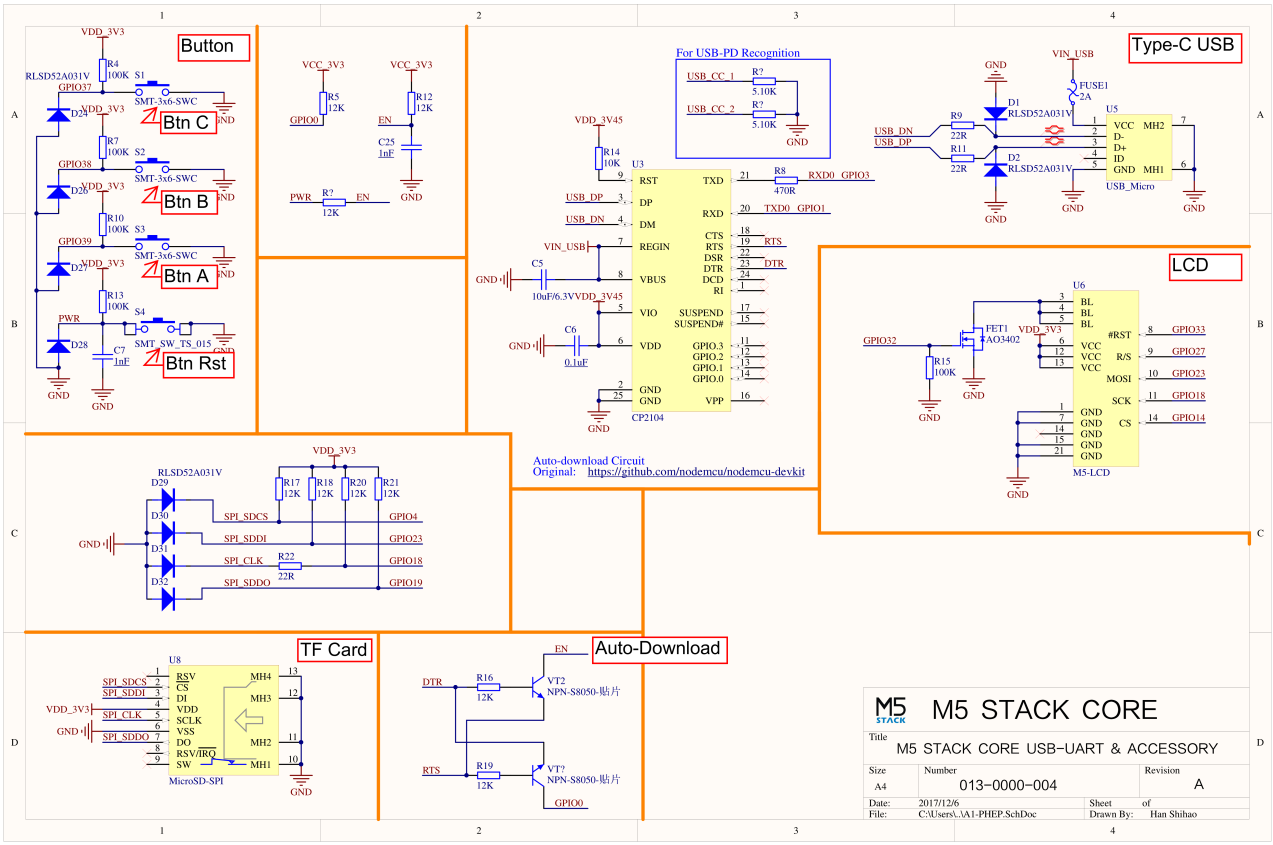
Drawn By: Han Shihao


Button
Btn C
Btn B
Btn A
Btn Rst
Type-C USB
For USB-PD Recognition
LCD
Auto-download Circuit
Original: https://github.com/nodemcu/nodemcu-devkit
TF Card
Auto-Download
M5 STACK CORE
M5 STACK CORE USB-UART & ACCESSORY
Size A4
Number 013-0000-004
Revision A
Date: 2017/12/6
File: C:\Users\..\A1-PHEP.SchDoc
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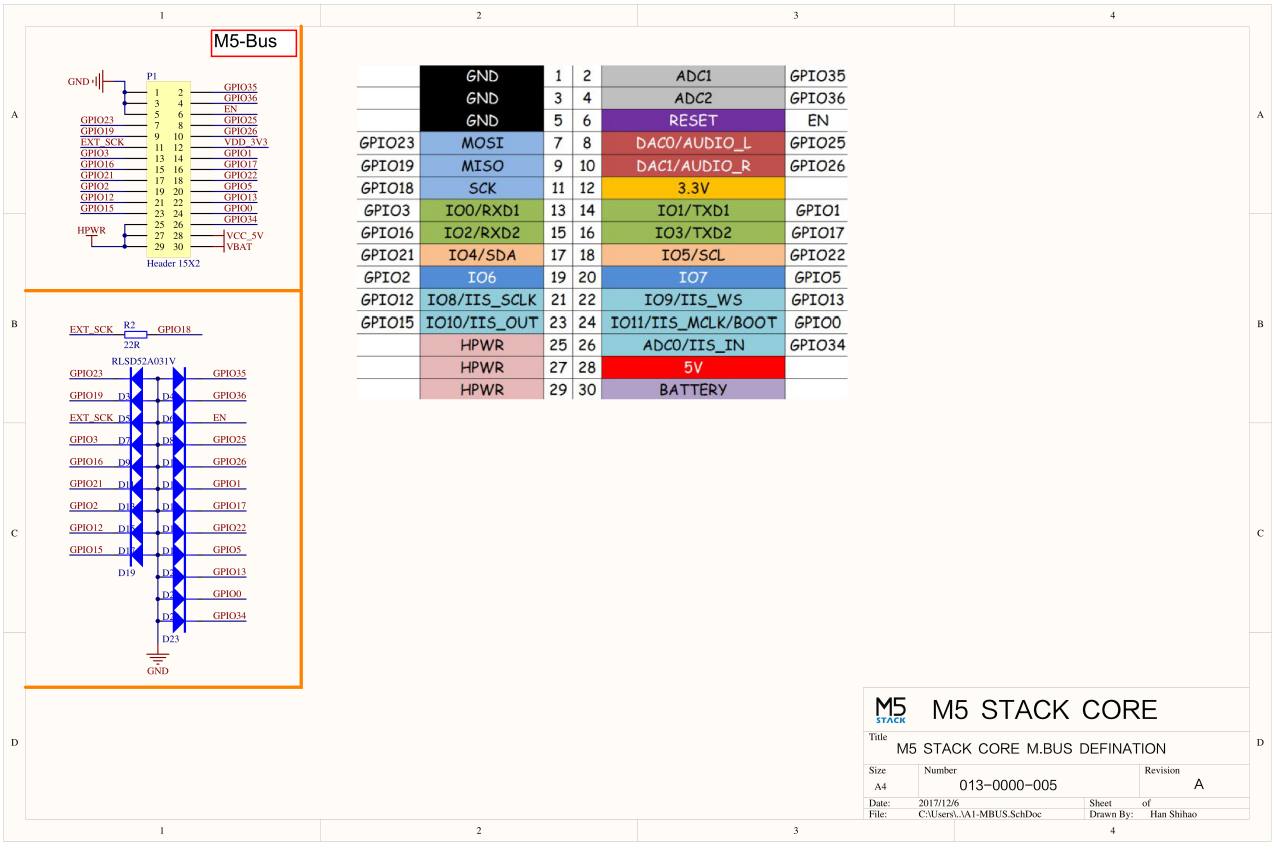
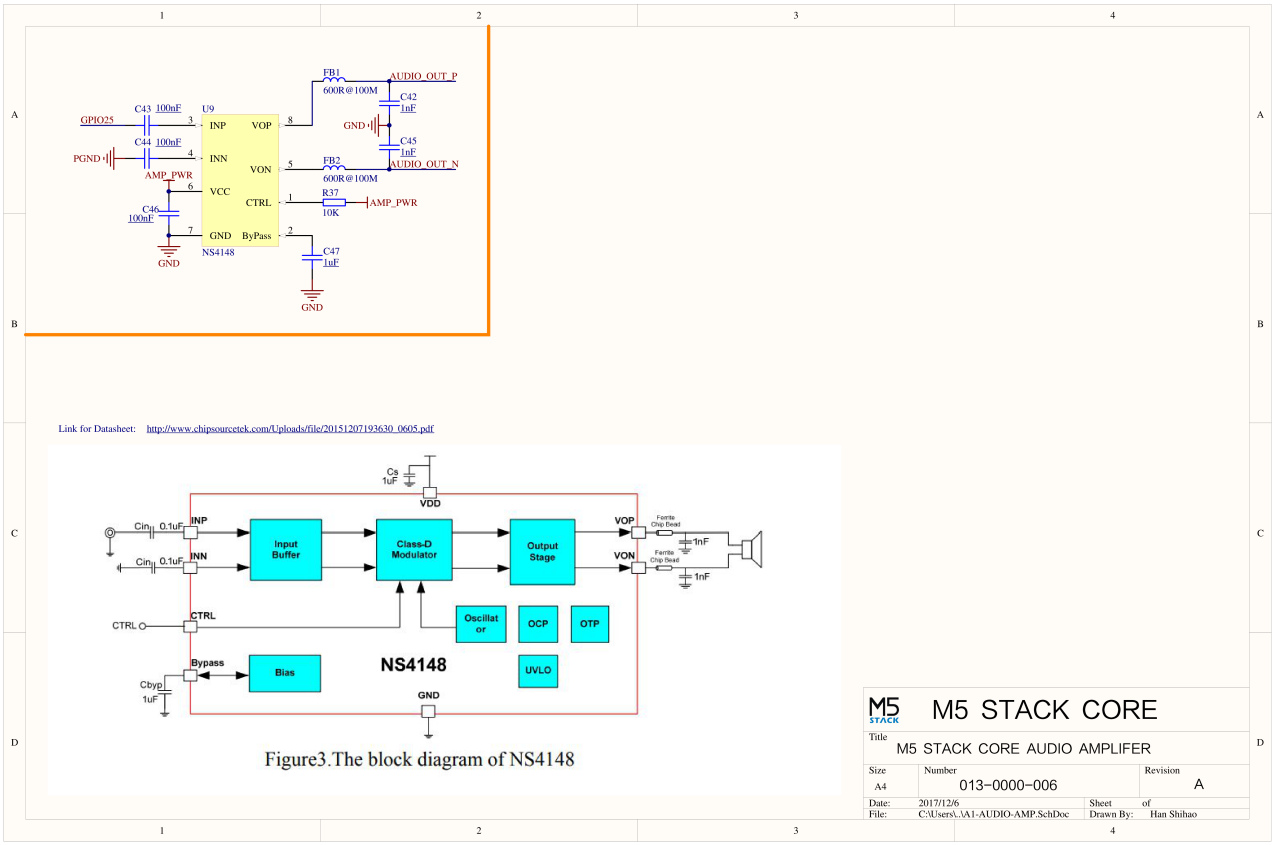
Drawn By: Han Shihao



	GND	1	2	ADC1	GPIO35
	GND	3	4	ADC2	GPIO36
	GND	5	6	RESET	EN
GPIO23	MOSI	7	8	DAC0/AUDIO_L	GPIO25
GPIO19	MISO	9	10	DAC1/AUDIO_R	GPIO26
GPIO18	SCK	11	12	3.3V	
GPIO3	IO0/RXD1	13	14	IO1/TXD1	GPIO1
GPIO16	IO2/RXD2	15	16	IO3/TXD2	GPIO17
GPIO21	IO4/SDA	17	18	IO5/SCL	GPIO22
GPIO2	IO6	19	20	IO7	GPIO5
GPIO12	IO8/IIS_SCLK	21	22	IO9/IIS_WS	GPIO13
GPIO15	IO10/IIS_OUT	23	24	IO11/IIS_MCLK/BOOT	GPIO0
	HPWR	25	26	ADC0/IIS_IN	GPIO34
	HPWR	27	28	5V	
	HPWR	29	30	BATTERY	



Link for Datasheet: http://www.chipsourcetek.com/Uploads/file/20151207193630_0605.pdf

Figure3.The block diagram of NS4148

PinMap

LCD Screen & TF Card

LCD Pixels: 320x240 TF Card supports up to 16GB

ESP32-D0WDQ6	GPIO23	GPIO19	GPIO18	GPIO14	GPIO27	GPIO33	GPIO32	GPIO4
ILI9342C	MOSI/MISO	/	CLK	CS	DC	RST	BL	
TF Card	MOSI	MISO	CLK	/	/	/	/	CS

Buttons & Speaker

ESP32-D0WDQ6	GPIO39	GPIO38	GPIO37	GPIO25
Button Pins	BUTTON A	BUTTON B	BUTTON C	
Speaker	/	/	/	Speaker Pin

GROVE Interface A & IP5306

The power management chip (IP5306) is a custom I2C version, and its I2C address is 0x75. Click here to view the IP5306 register manual.

ESP32-D0WDQ6	GPIO22	GPIO21	5V	GND
GROVE A	SCL	SDA	5V	GND
IP5306	SCL	SDA	5V	GND

IP5306 Charge/Discharge, Voltage Parameters

Charging	Discharging
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%

MPU6886

MPU6886 I2C address 0x68

ESP32-D0WDQ6	GPIO22	GPIO21	5V	GND
MPU6886	SCL	SDA	5V	GND

M5GO Base PinMap

LED Strip & Microphone & Speaker

ESP32-D0WDQ6	GPIO15	GPIO34	GPIO25
Hardware	SIG Pin	MIC Pin	Speaker Pin

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

HY2.0-4P

HY2.0-4P	Black	Red	Yellow	White
PORT.A	GND	5V	G21	G22
PORT.B	GND	5V	G26	G36
PORT.C	GND	5V	G16	G17

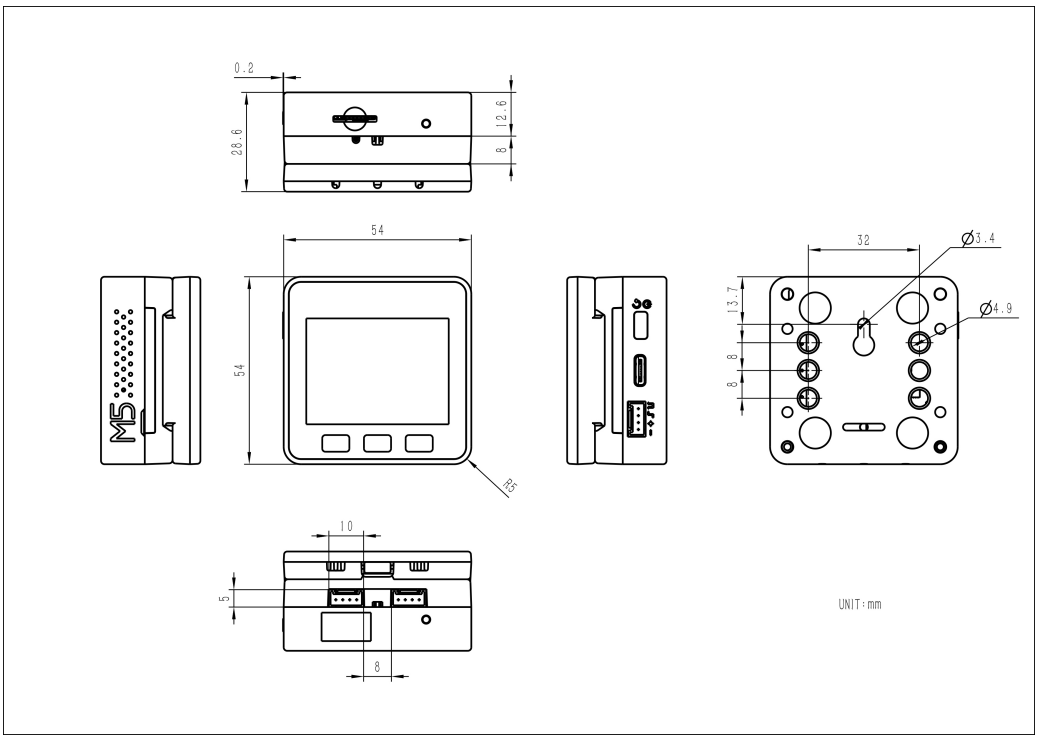
M5-Bus

GPIO TYPE	Analog Function	M-BUS LINE 0		LINE 1		Analog Function	GPIO TYPE
		GND		ADC	G35	ADC1_CH7	I
		GND		ADC	G36	ADC1_CH0	I
		GND		RST	EN		
I/O/T		G23	MOSI	DAC/SPK	G25	ADC2_CH8	I/O/T
I/O/T		G19	MISO	DAC	G26	ADC2_CH9	I/O/T
I/O/T		G18	SCK	3.3V			
I/O/T		G3	RXD1	TXD1	G1		I/O/T
I/O/T		G16	RXD2	TXD2	G17		I/O/T
I/O/T		G21	SDA	SCL	G22		I/O/T
I/O/T	ADC2_CH2/T2	G2	GPIO	GPIO	G5		I/O/T
I/O/T	ADC2_CH5	G12	IIS_SK	IIS_WS	G13	ADC2_CH4/T4	I/O/T
I/O/T	ADC2_CH3/T3	G15	IIS_OUT	IIS_MK	G0	ADC2_CH1/T1	I/O/T
		HPWR		IIS_IN	G34	ADC1_CH6	I
		HPWR		5V			
		HPWR		BATTERY			

When using the RGB LED on GPIO15, it is recommended to initialize the pin with pinMode(15, OUTPUT_OPEN_DRAIN);

For more information on pin allocation and pin remapping, please refer to the ESP32 datasheet

Model Size



Datasheets

- **Datasheet**
  - ESP32
  - ILI9342C
  - MPU6886
  - IP5306

Softwares

Arduino

- Fire v2.7 Arduino Quick Start
- Fire v2.7 Arduino API
- Fire v2.7 GitHub

UiFlow1

- Fire v2.7 UiFlow1 Quick Start

UiFlow2

- Fire v2.7 UiFlow2 Quick Start

USB Driver

Click the link below to download the driver for your operating system. There are currently two driver chip versions, CP210X (for **CP2104** version) / CP34X (for **CH9102** version) driver package. After extracting the package, select the installation package corresponding to your operating system bit for installation. (If you are unsure of the USB chip used by your device, you can install both drivers. **CH9102_VCP_SER_MacOS v1.7** may report an error during installation, but it has actually been installed, just ignore it.) If you encounter issues downloading programs (timeout or Failed to write to target RAM), try reinstalling 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

MacOS Port Selection

In MacOS, there may be two selectable ports, please choose the port named **wchmodem** when using.

Easyloader

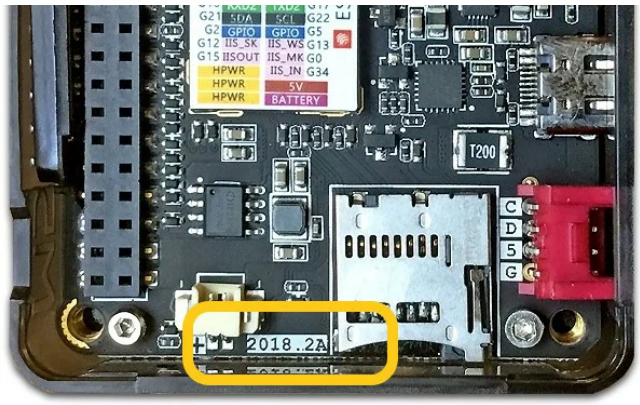
Easyloader	Download Link	Note
Fire v2.7 Factory Firmware Easyloader	download	/

Video

Version Change

Release Date	Product Changes	Remarks
2018.6	Initial release	/
2019.7	MPU9250 changed to SH200Q+BMM150, TN screen changed to IPS screen	Please upgrade your M5Stack library to the latest version (v0.2.8 or above) to fix screen inversion issue
2019.8	SH200Q changed to MPU6886	/
2019.11	Battery capacity changed from 600mAh to 500mAh	/
2020.4	PSRAM size changed from 4MB to 8MB	/
2021.8	Upgraded to v2.6: Removed BMM150 magnetometer, CP2104 changed to CH9102, structural details optimized	/
2023.4	Upgraded to v2.7	Screen changed to glass screen for clearer display, Grove port added boost function for stable 5.1v output, more stable under load

Note: Devices with **2018.2A** PCB version do not support C2C (Type-C to Type-C) connection and PD power supply.



New vs Old Version Comparison


FIRE V2.6
Acrylic
FIRE V2.7
Glass

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

M5Stack:

K007-V27