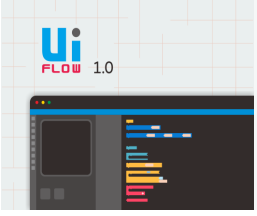
Basic v2.7

SKU:K001-V27

Description

Basic v2.7 is a cost-effective IoT entry-level main controller. It uses the Espressif **ESP32** chip, equipped with 2 low-power **Xtensa® 32-bit LX6** microprocessors, with a main frequency of up to **240 MHz**. It has onboard **16 MB FLASH** memory, integrated with a **2.0-inch full-color high-definition IPS display panel**, **speaker**, **TFCard slot**, and other peripherals. The full-cover casing ensures the **stability** of circuit operation even in complex industrial application scenarios. The internal bus provides multiple common interface resources (ADC/DAC/I2C/UART/SPI, etc.), with 15 x IO leads on the bottom bus, offering strong expandability. It is suitable for various product prototype development, industrial control, and smart building application scenarios.

Tutorial



UIFlow

This tutorial introduces how to control the Basic device using the UiFlow1 graphical programming platform.

UiFlow2

This tutorial introduces how to control the Basic device through the UiFlow2 graphical programming platform.

Arduino IDE

This tutorial introduces how to program and control the Basic device using the Arduino IDE.

Features

- **Highly Productized**:
  - Exquisite appearance design, directly corresponding to product landing from prototype development
  - Product-level 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 through dual-core and multitasking mechanisms
- **High Integration**:
  - 2.0-inch IPS display panel, speaker, customizable buttons x3
  - Built-in lithium battery power supply, integrated power management chip, supports Type-C interface
  - Professionally modulated RF circuit provides stable and reliable wireless communication quality
- **Strong Expandability**:
  - 15 x IO leads
  - Easily integrate into M5Stack's hardware and software system, stackable module design, plug-and-play sensor expansion
- Developed based on ESP32
- 16M Flash
- Integrated full-color high-definition IPS display panel and various hardware peripherals
- Rich resource interfaces, compatible with M5Stack stackable module system and sensor system, extremely expandable
- Uses M5CORE BOTTOM base with built-in lithium battery, 15 x IO leads
- Development Platform
  - UiFlow1
  - UiFlow2
  - Arduino IDE
  - ESP-IDF
  - PlatformIO

Includes

- 1 x Basic v2.7
- 10 x Dupont wires
- 1 x USB Type-C cable (20cm)
- 1 x User manual

Applications

- IoT Controller
- Maker DIY Projects
- Smart Home Control

Specifications

Specification	Parameter
SoC	ESP32-D0WDQ6-V3@Dual-core processor, 240MHz
DMIPS	600
SRAM	520KB
Flash	16MB
Wi-Fi	2.4 GHz Wi-Fi
Input Power	5V@500mA
Interface	USB Type-C x1, I2C x1
IO	G21, G22, G23, G19, G18, G3, G1, G16, G17, G2, G5, G25, G26, G35, G36
Buttons	Physical buttons x 3
LCD Screen	2.0"@320 x 240 ILI9342C IPS panel, max brightness 853nit
Speaker	1W-0928
USB Chip	CH9102F
Antenna	2.4G 3D antenna
Battery	110mAh @ 3.7V
Casing Material	Plastic (PC)
Product Size	54.0 x 54.0 x 17.0mm
Product Weight	49.4g
Package Size	88.0 x 56.0 x 22.0mm
Gross Weight	76.0g

Learn

Power On/Off Operations

Power On: Toggle the bottom switch to **1**, single-click the red power button on the left

Power Off: Without USB power, quickly double-click the red power button on the left, or toggle the bottom switch to **0**.

USB Power: By default, when USB powered, the device cannot be turned off.

Schematics

- Basic v2.7 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

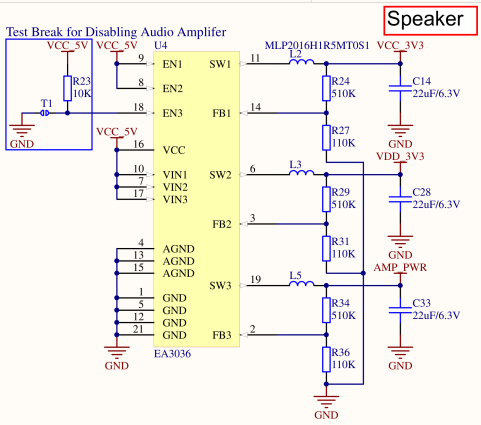
M5 STACK CORE

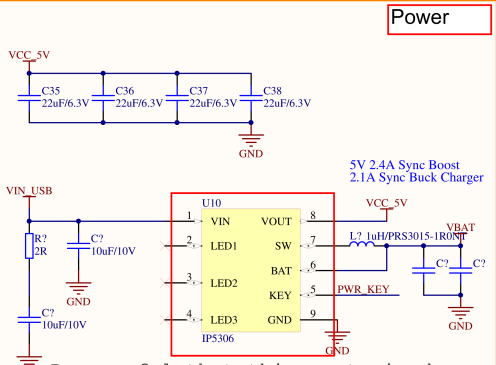
Title: M5 STACK CORE COVER

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.

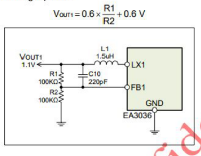
Link for Datasheet: http://198.13.102.98/bj/ingenic_support/X1000_X1000E_X1500/02_HW/00_Halley2/Halley2_coreV3.0_baseV2.0/06Datasheet/PMIC/EA3036_1.0_2014_Sep.pdf

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:

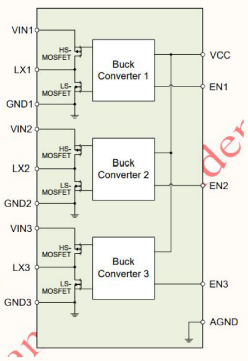
$$V_{OUT1} = 0.6 \times \frac{R1}{R2} + 0.6\ V$$



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%

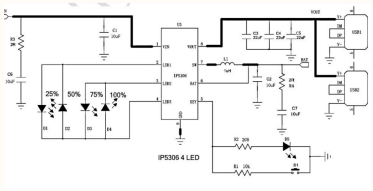
Function Block Diagram



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.
		1.0	0.47	±20%	2	0.055±25%	1700	MLP2016HF47MT0S1
		1.0	1.0	±20%	2	0.09±25%	1300	MLP2016H1R0MT0S1
	Low resistance	1.0	1.5	±20%	2	0.11±25%	1200	MLP2016H1R5MT0S1
		1.0	2.2	±20%	2	0.11±25%	1200	MLP2016H2R2MT0S1
Low core loss		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	MLP2016VF47MT0S1
		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



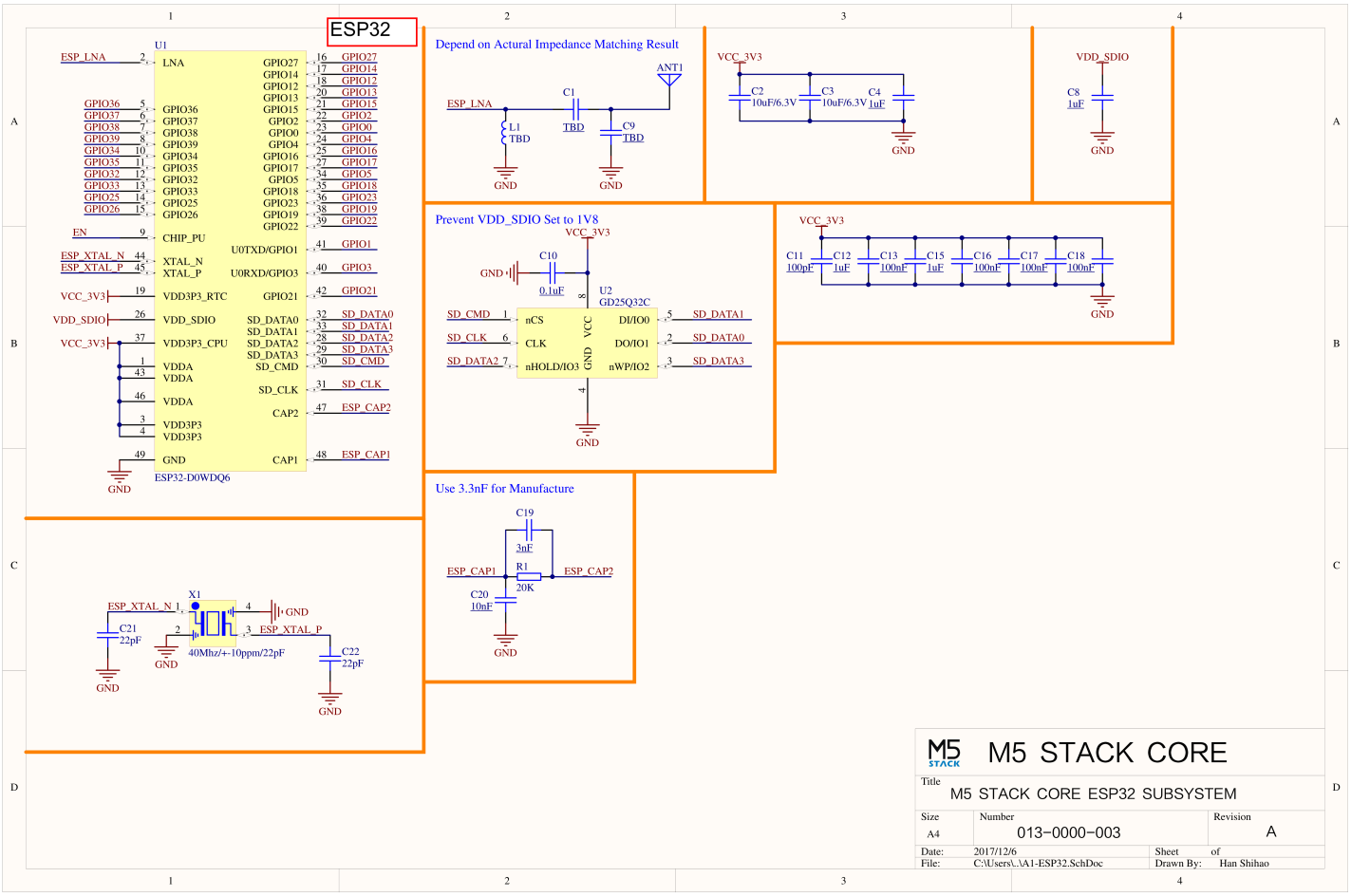
M5 STACK CORE

Title: M5 STACK CORE POWER MANAGEMENT

Size	Number	Revision
A4	013-0000-002	A

Date: 2017/12/6 Sheet of

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


ESP32
U1
ESP32-D0WDQ6
Depend on Actural Impedance Matching Result
ANT1
C1
TBD
L1
TBD
C9
TBD
VCC_3V3
C2
10uF/6.3V
C3
10uF/6.3V
C4
1uF
VDD_SDIO
C8
1uF
Prevent VDD_SDIO Set to 1V8
C10
0.1uF
U2
GD25Q32C
C11
100pF
C12
1uF
C13
100nF
C15
1uF
C16
100nF
C17
100nF
C18
100nF
Use 3.3nF for Manufacture
C19
3nF
R1
20K
C20
10nF
X1
40Mhz/+-10ppm/22pF
C21
22pF
C22
22pF
GND
M5 STACK CORE
M5 STACK CORE ESP32 SUBSYSTEM
Size
A4
Number
013-0000-003
Revision
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Drawn By:
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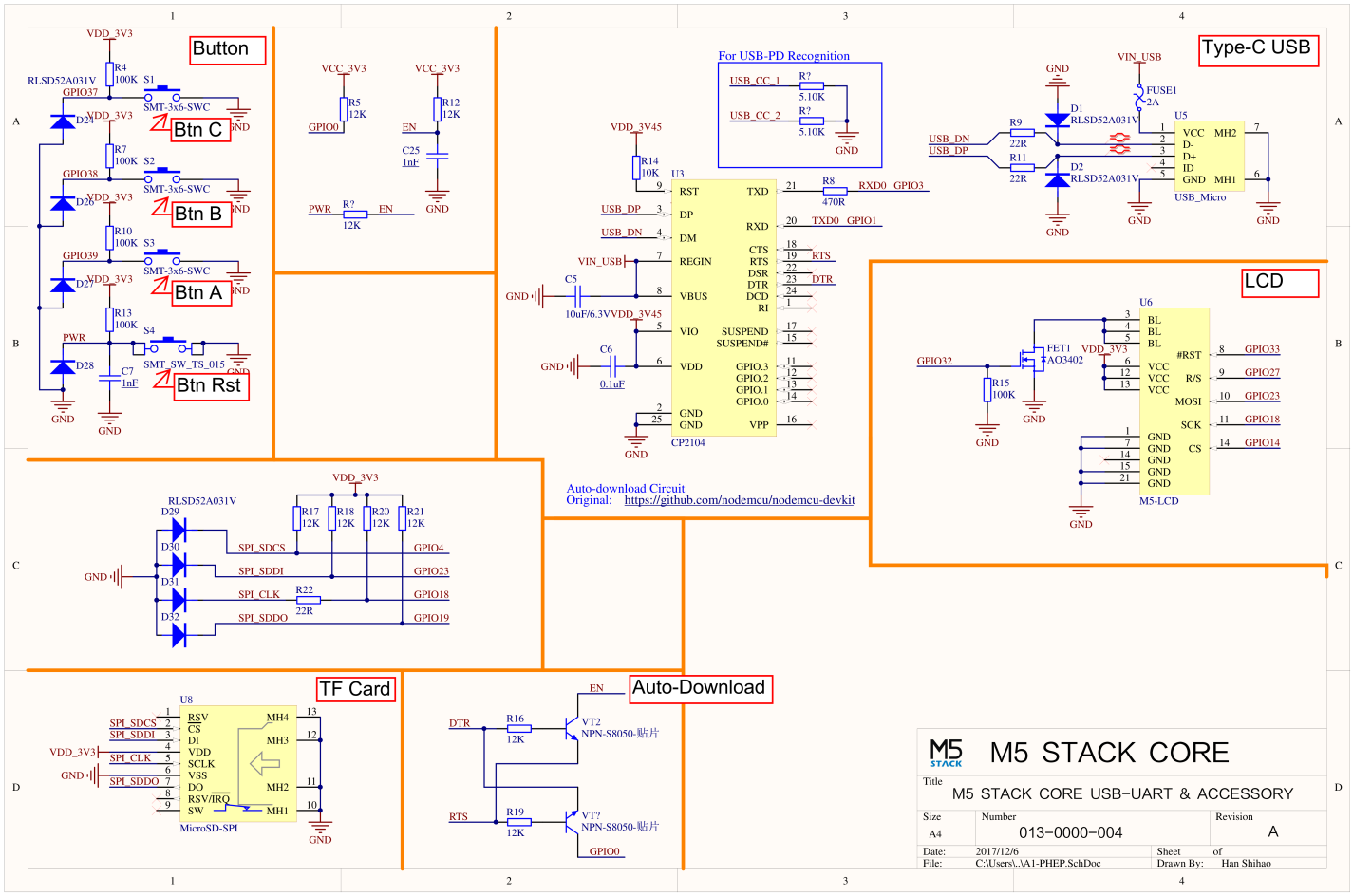
Button
Btn C
Btn B
Btn A
Btn Rst
For USB-PD Recognition
Type-C USB
USB_Micro
Auto-download Circuit
Original: https://github.com/nodemcu/nodemcu-devkit
CP2104
LCD
M5-LCD
TF Card
MicroSD-SPI
Auto-Download
M5 STACK CORE
M5 STACK CORE USB-UART & ACCESSORY
013-0000-004
2017/12/6
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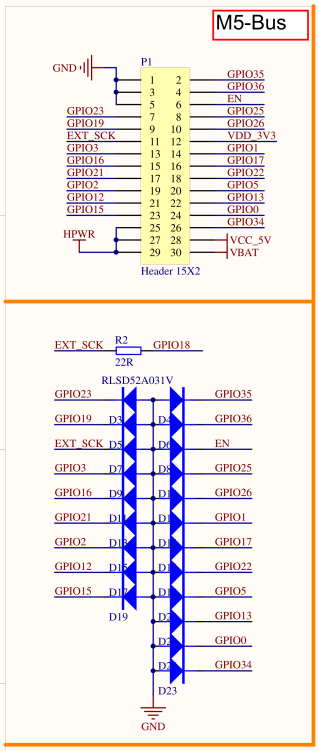
Han Shihao



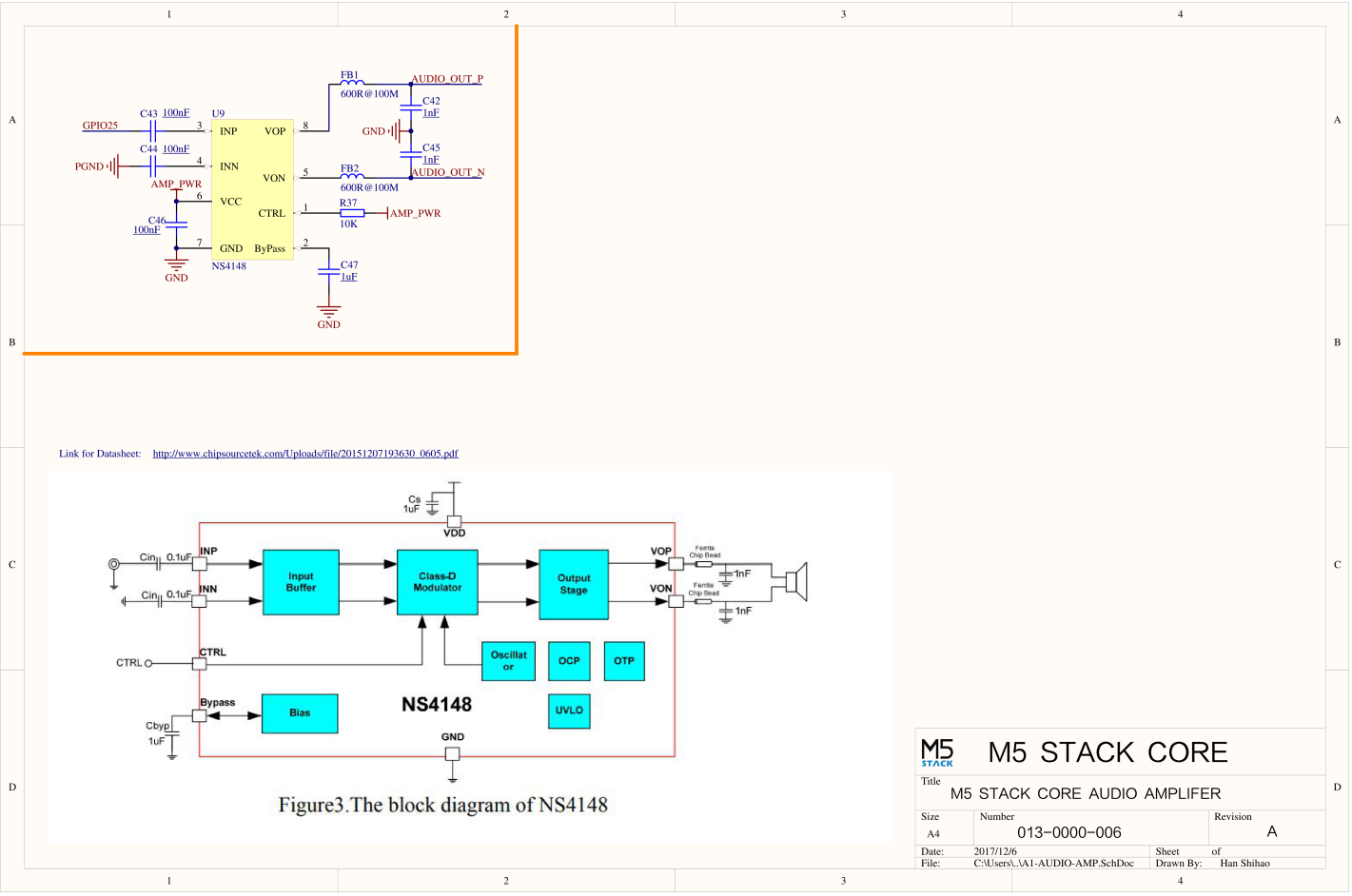
	GND	1	2	ADC1	GPIO35
	GND	3	4	ADC2	GPIO36
	GND	5	6	RESET	EN
GPIO23	MOSI	7	8	DAC0/AUDIO_L	GPIO25
GPIO19	MISO	9	10	DAC1/AUDIO_R	GPIO26
GPIO18	SCK	11	12	3.3V	
GPIO3	IO0/RXD1	13	14	IO1/TXD1	GPIO1
GPIO16	IO2/RXD2	15	16	IO3/TXD2	GPIO17
GPIO21	IO4/SDA	17	18	IO5/SCL	GPIO22
GPIO2	IO6	19	20	IO7	GPIO5
GPIO12	IO8/IIS_SCLK	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	

M5 STACK CORE

Title: M5 STACK CORE M.BUS DEFINATION

Size	Number	Revision
A4	013-0000-005	A

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



PinMap

LCD Screen & TF Card

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

ESP32-D0WDQ6-V3	G23	G19	G18	G14	G27	G33	G32	G4
ILI9342C	MOSI/MISO		CLK	CS	DC	RST	BL	
TF Card	MOSI	MISO	CLK					CS

Buttons & Speaker

ESP32-D0WDQ6-V3	G39	G38	G37	G25
Button Pin	BUTTON A	BUTTON B	BUTTON C	
Speaker				Speaker Pin

GROVE Interface A & IP5306

The power management chip (IP5306) is a custom I2C version with an I2C address of 0x75. Click here to view the IP5306 register manual.

ESP32-D0WDQ6-V3	G22	G21	5V	GND
GROVE A	SCL	SDA	5V	GND
IP5306 (0x75)	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%

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

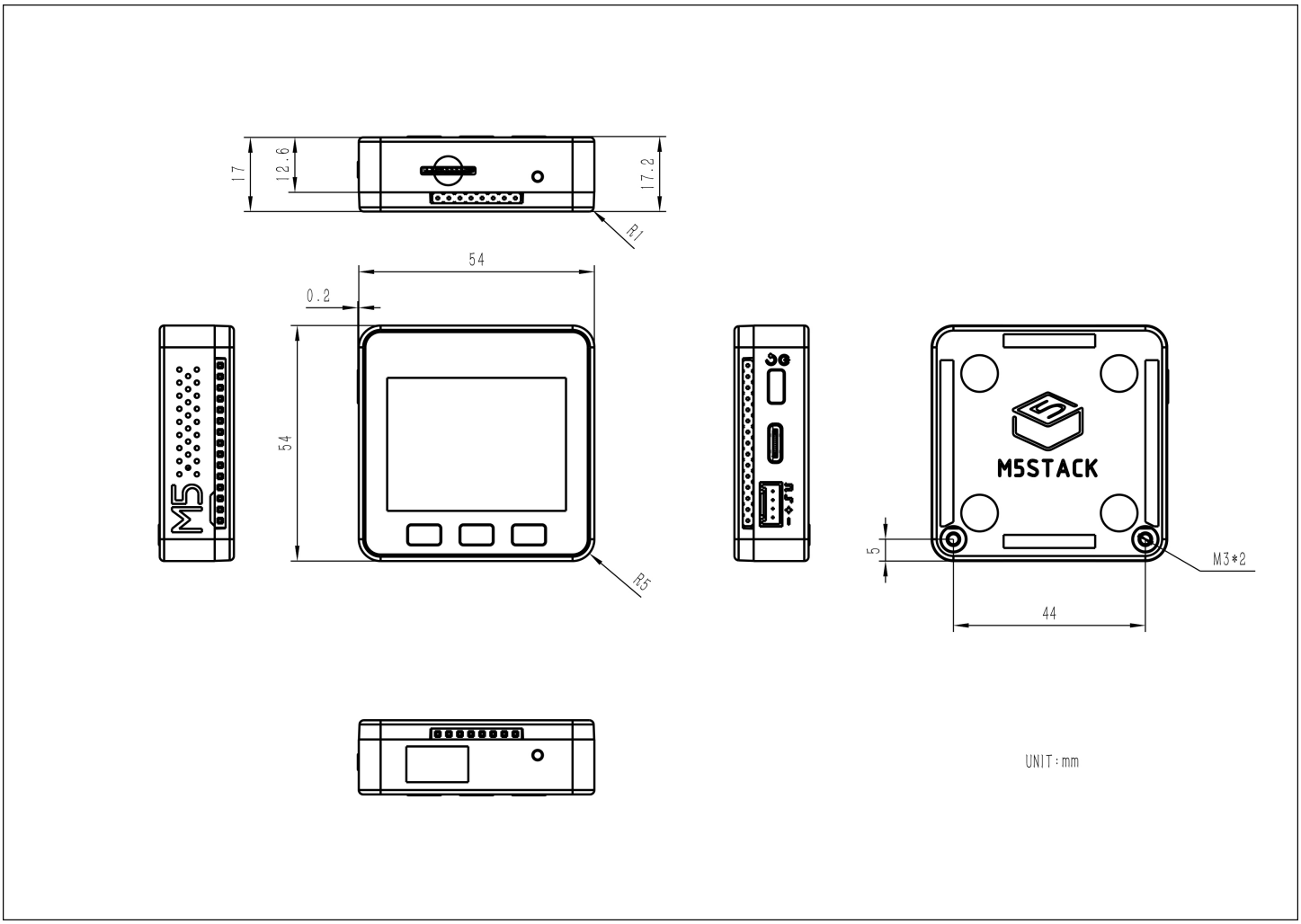
HY2.0-4P

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

FUNC	PIN	LEFT	RIGHT	PIN	FUNC
	GND	1	2	G35	ADC
	GND	3	4	G36	ADC
	GND	5	6	RST	EN
MOSI	G23	7	8	G25	DAC/SPK
MISO	G19	9	10	G26	DAC
SCK	G18	11	12	3V3	
RXD0	G3	13	14	G1	TXD0
RXD2	G16	15	16	G17	TXD2
Int SDA	G21	17	18	G22	Int SCL
GPIO	G2	19	20	G5	GPIO
I2S_SK	G12	21	22	G13	I2S_WS
I2S_OUT	G15	23	24	G0	I2S_MK
	HPWR	25	26	G34	I2S_IN
	HPWR	27	28	5V	
	HPWR	29	30	BAT	

Model Size



Structure

- Basic v2.7 Structure Files

Datasheets

- ESP32
- ILI9342C
- IP5306

Softwares

Arduino

- Basic v2.7 Arduino Quick Start
- Basic v2.7 Arduino Driver Library
- Basic v2.7 Arduino API

UiFlow1

- Basic v2.7 UiFlow1 Quick Start

UiFlow2

- Basic v2.7 UiFlow2 Quick Start

PlatformIO

```
[env:m5stack-core]
platform = espressif32@6.7.0
board = m5stack-core-esp32
framework = arduino
upload_speed = 1500000
monitor_speed = 115200
build_flags =
    -DCORE_DEBUG_LEVEL=5
lib_deps =
    M5Unified=https://github.com/m5stack/M5Unified
```

USB Driver

Driver Download

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

Driver Name	Applicable Driver Chip	Download Link
CH9102_VCP_SER_Windows	CH9102	Download
CH9102_VCP_SER_MacOS v1.7	CH9102	Download

Easyloader

Easyloader	Download Link	Note
Basic v2.7 Test Easyloader	download	/

Video

- Hardware operation tests for speaker, wifi, buttons, accelerometer, TF-card (microSD), screen, etc.

BASIC.mp4

- Connect sensors to EzData to build a smart home

将传感器连接到EzData组建智能家居.mp4

Product Comparison

To compare information on the controller series products, you can visit the Product Selection Table, check the target products, and get the comparison results. The selection table covers key information such as core parameters and functional features, and supports comparison of multiple products simultaneously.

Version Change

Release Date	Product Changes	Note
2017.7	First Release (Core1.4)	/
2019.7	TN screen changed to IPS screen (Core2.2)	Please upgrade your M5Stack library to the latest version (v0.2.8 or above) to fix screen color inversion issues
2020.3	Battery capacity changed from 150mAh to 110mAh (Core2.4)	/
2020.6	Flash size changed from 4MB to 16MB (Core2.5)	/
2021.10	Upgraded to v2.6, changed CP2104 to CH9102, optimized structural details (Core2.6)	/
2023.4	Upgraded to v2.7 version	Screen changed to glass screen for clearer display, Grove port added boost function for stable 5.1v output, more stable with load; added battery power switch

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