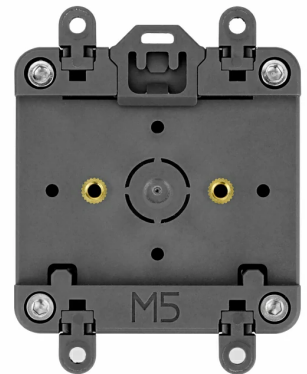
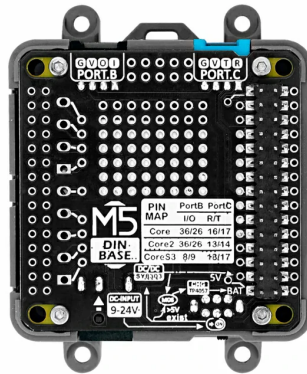


# CoreS3

SKU:K128





## Description

**CoreS3** is the third-generation main controller of the M5Stack development kit series, based on the **ESP32-S3** solution featuring a dual-core Xtensa LX7 processor running at 240 MHz with built-in Wi-Fi. It integrates 16MB Flash and 8MB PSRAM. Programs can be downloaded through the USB Type-C port, and **OTG & CDC** functions are supported for connecting USB devices and flashing firmware.

The front houses a 2.0-inch capacitive-touch IPS panel protected by high-strength glass. Below the screen is a 0.3MP GC0308 camera paired with an LTR-553ALS-WA proximity sensor. Power is managed by an AXP2101 PMU and four power-path control circuits, delivering a low-power design. Onboard sensors include a six-axis IMU BMI270 and a magnetometer BMM150. Additional peripherals comprise a microSD slot and a BM8563 RTC, enabling precise time-keeping plus sleep/timed-wake-up functions.

For audio, a 16-bit I2S amplifier AW88298 drives the built-in 1W speaker, while an ES7210 audio codec provides dual-microphone input. Independent POWER and RESET (RST) buttons are located on the side; long-pressing the RESET button enters download mode via a self-built delay circuit.

The kit ships with a DinBase for DIN-rail, wall-mount or screw mounting. It can be powered by an external DC 12V (9 ~ 24V) supply or an internal 500mAh Li-ion battery. Multiple proto areas on the DinBase ease DIY expansion.

Ideal for IoT development, DIY projects, smart-home control systems and industrial automation control systems.

## Tutorial



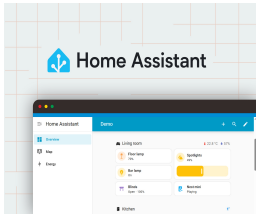
### Arduino IDE

This tutorial explains how to program and control CoreS3 using Arduino IDE.



### UiFlow2

This tutorial shows how to control CoreS3 via the UiFlow2 graphical programming platform.



## Home Assistant

This tutorial describes how to connect CoreS3 to Home Assistant.



## CoreS3 Xiaoling Voice Assistant

This tutorial will introduce how to use the CoreS3 controller to burn the Xiaoling Voice Assistant firmware via M5Burner and build a personal voice assistant application.

## Features

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- ESP32-based development, Wi-Fi, 16 MB Flash, 8 MB PSRAM
- Built-in camera, proximity sensor, speaker, power-indicator LED, RTC, I2S amplifier, dual microphones, capacitive touch screen, power button, reset button, gyroscope
- microSD slot
- High-strength glass panel
- Supports OTG & CDC functions
- AXP2101 power management, low-power design
- Development Platform
  - UiFlow2
  - Arduino IDE
  - ESP-IDF
  - PlatformIO

## Includes

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- 1 × CoreS3
- 1 × DinBase
- 1 × Hex Key L-Shape 2.5 mm (For M3 Screw)
- 4 × Screw Buckle
- 1 × Rail-mount Base Buckle

## Applications

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- IoT development
- DIY project development
- Smart-home control systems
- Industrial automation control systems

## Specifications

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Specification	Parameter
SoC	ESP32-S3 @ Dual-core Xtensa LX7 processor, 240MHz main frequency
Flash	16MB
PSRAM	8MB
Wi-Fi	2.4 GHz Wi-Fi
Touch IPS LCD	2.0" @320 × 240 ILI9342C
Camera	GC0308 0.3MP
Proximity Sensor	LTR-553ALS-WA
Power Management	AXP2101
6-axis IMU	BMI270
3-axis Magnetometer	BMM150
RTC	BM8563
Speaker	16-bit I2S amplifier AW88298 @1W
Audio Codec	ES7210, dual-microphone input
Product Size	Whole set (CoreS3+DinBase): 69.0 × 54.0 × 31.5mm Main unit (CoreS3): 54.0 × 54.0 × 15.5mm
Product Weight	72.7g
Package Size	105.6 × 66.0 × 35.3mm
Gross Weight	101.8g

## Learn

### BMM150 Magnetic Interference

Products containing magnets may interfere with the BMM150 magnetic sensor, resulting in abnormal readings. When used with M5 controllers that have magnets, remove the magnets and avoid placing the BMM150 near strong magnetic fields.

## Download Mode

Long-press the RESET button for 3 s (green LED on) to enter download mode before flashing firmware.

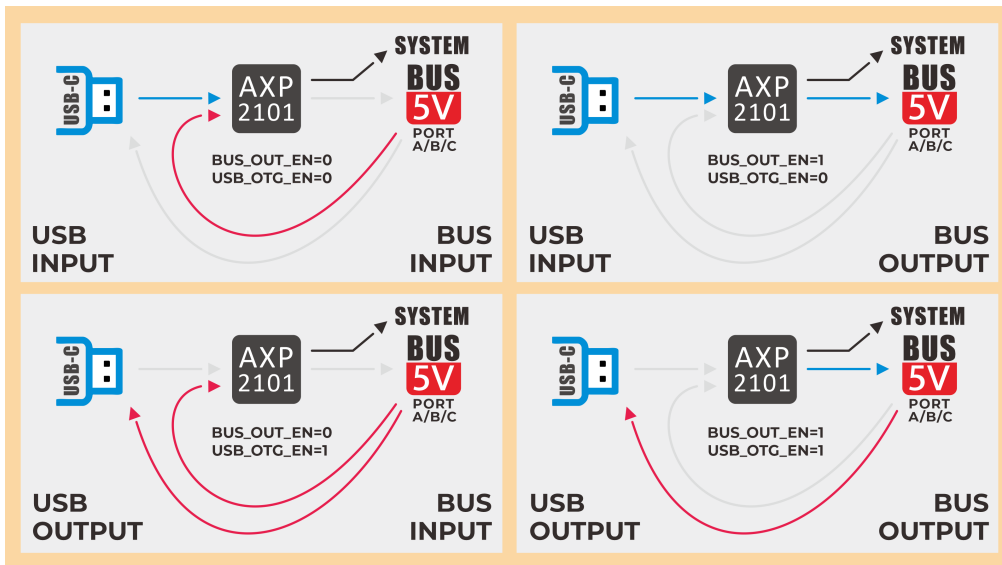


## Power On/Off

- Power-on: single-click the left POWER button
- Power-off: long-press the left POWER button for 6 s
- Reset: single-click the bottom RST button

## Power Management

CoreS3 uses the AXP2101 PMU together with the AW9523B IO expander to control power input/output directions. Refer to the pin states of `BUS_OUT_EN` and `USB_OTG_EN` in the figure below and check the example code in [CoreS3 Power Manager Example](#).

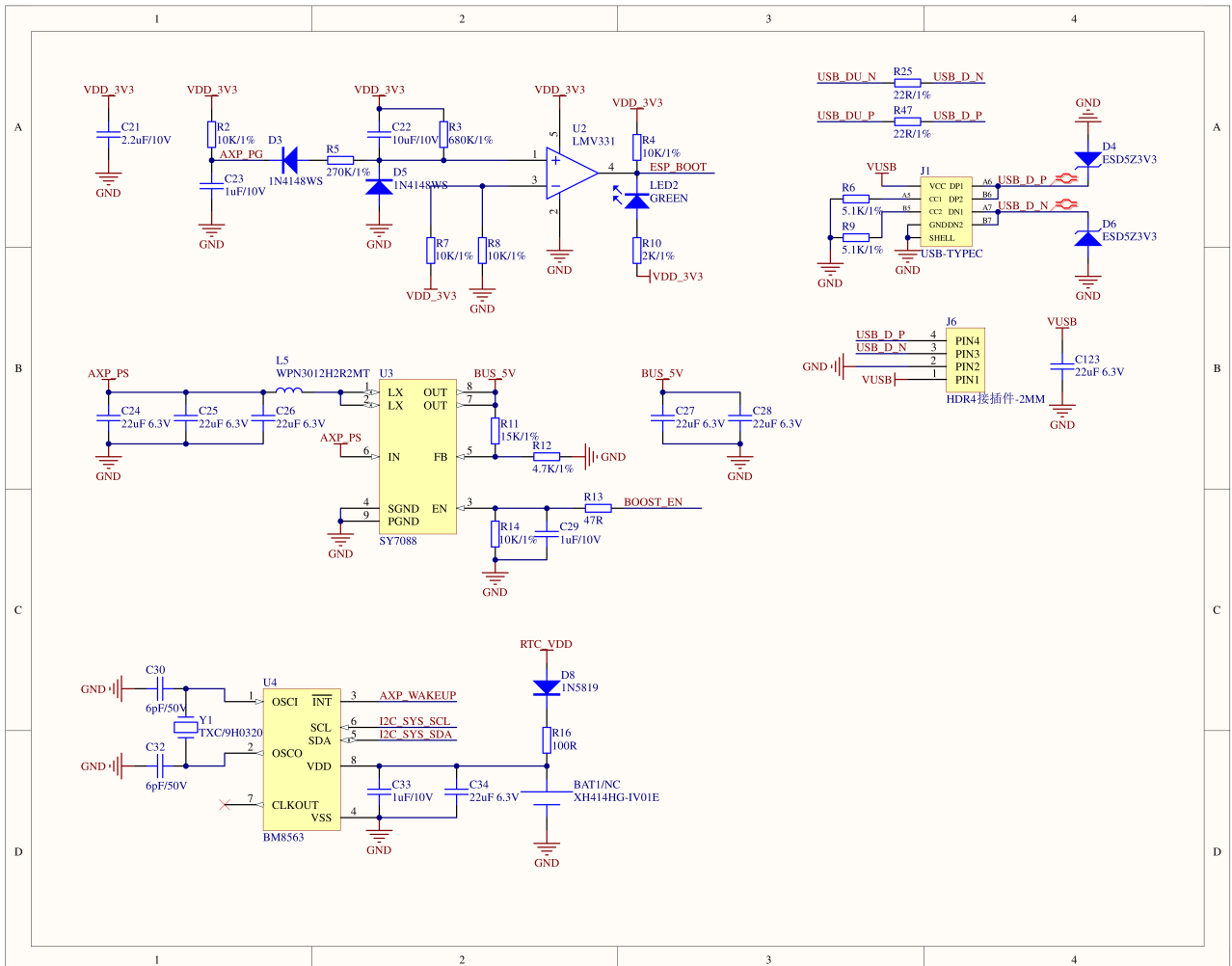
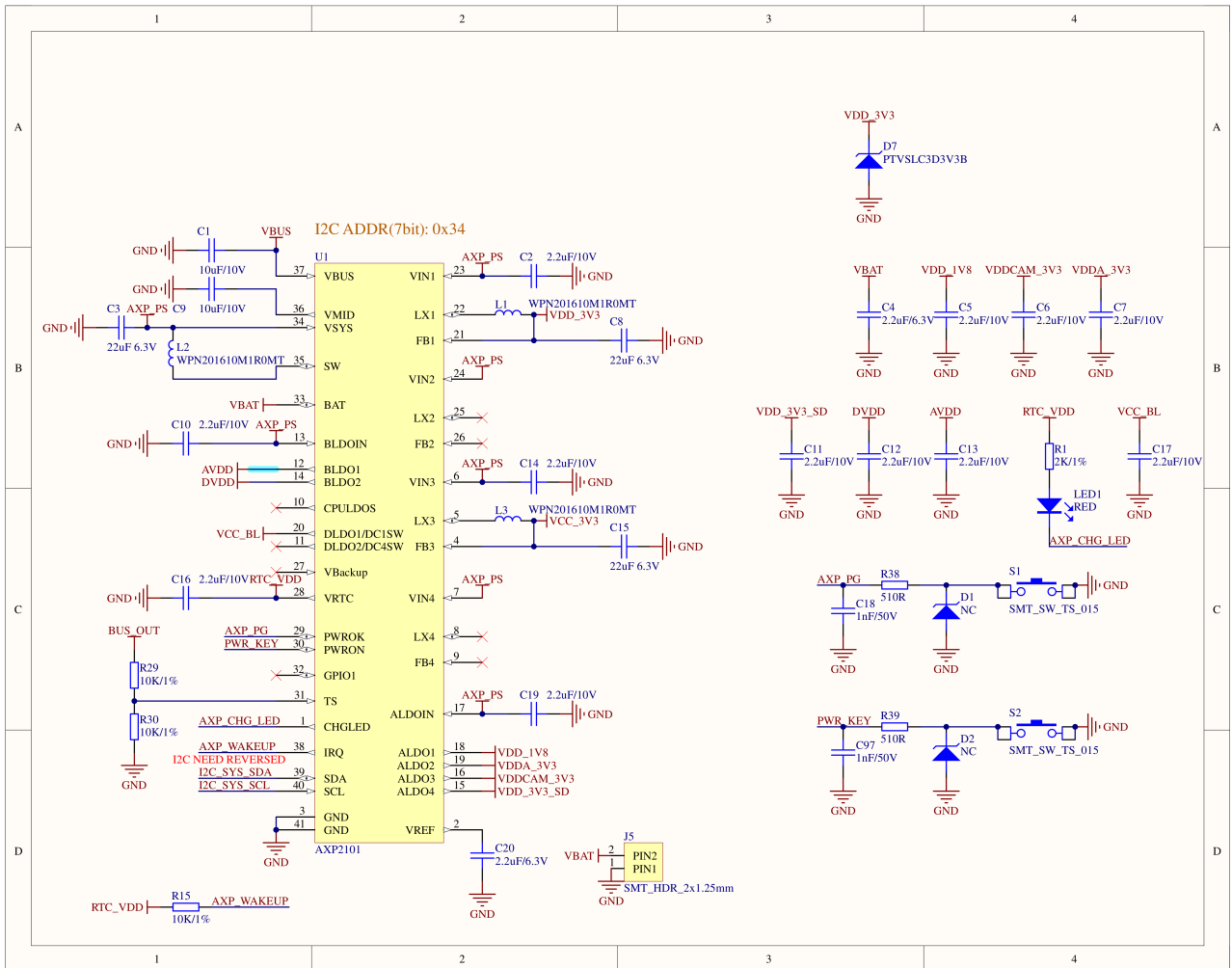


## Certifications

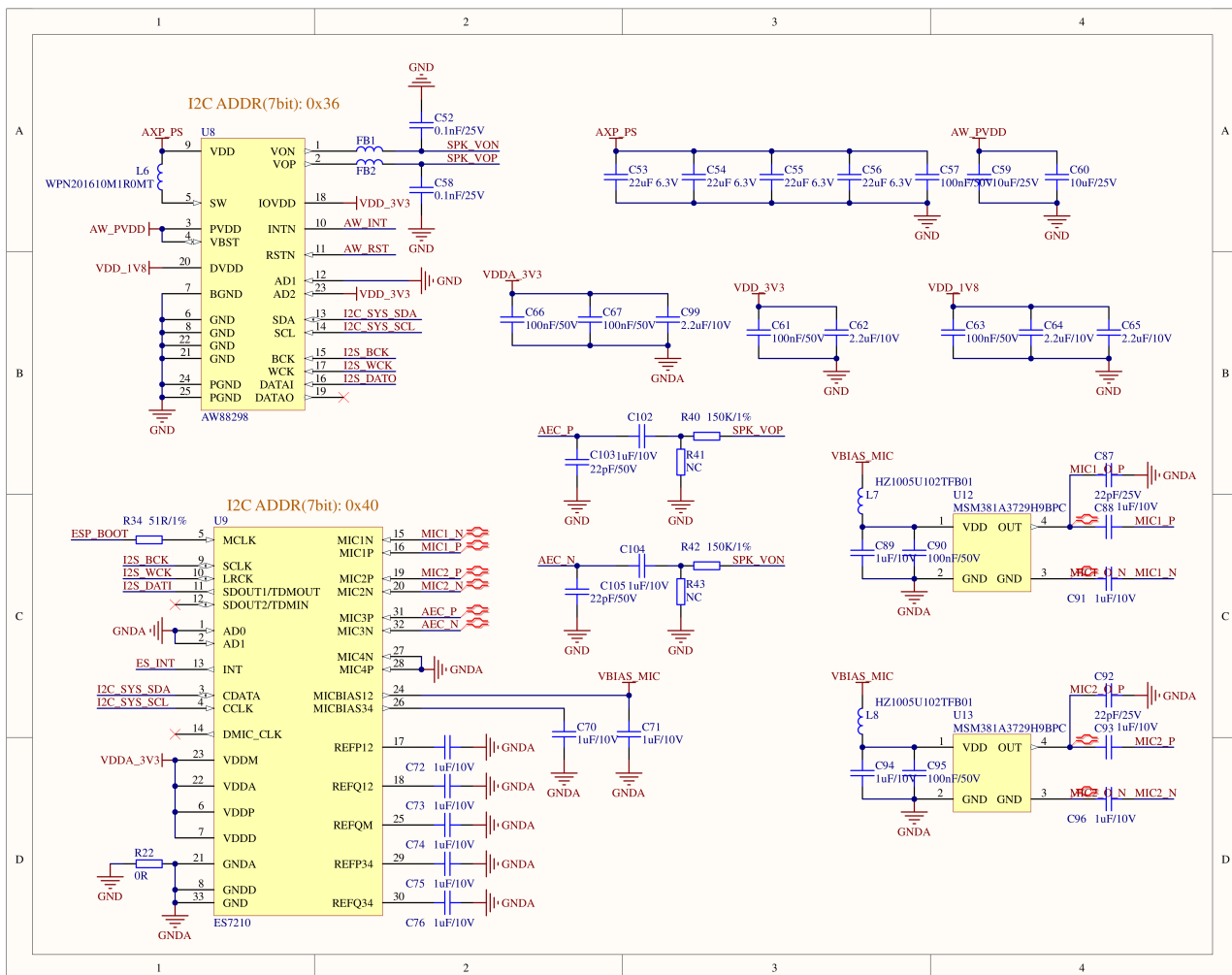
- CE/MIC/FCC/SAR

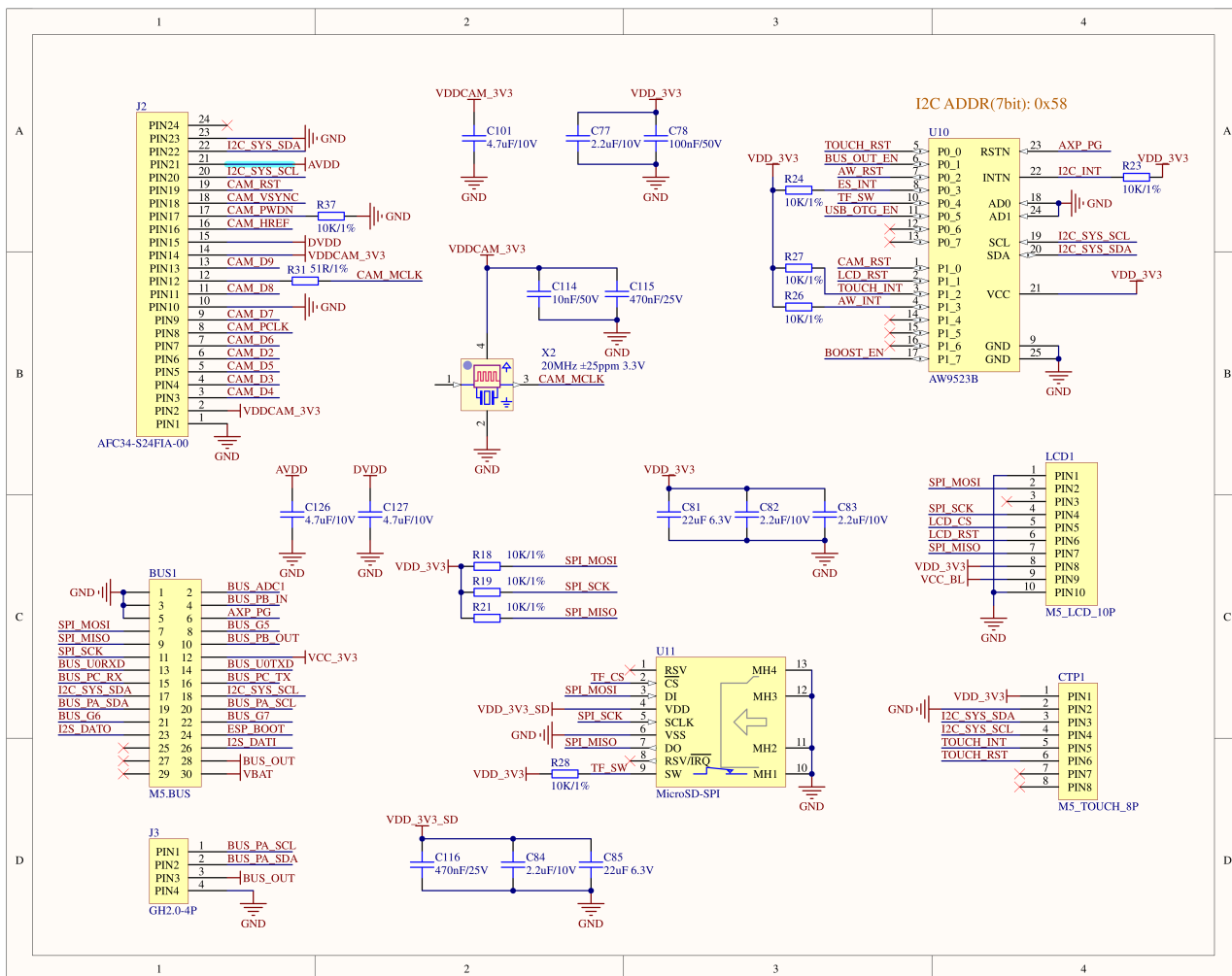
## Schematics

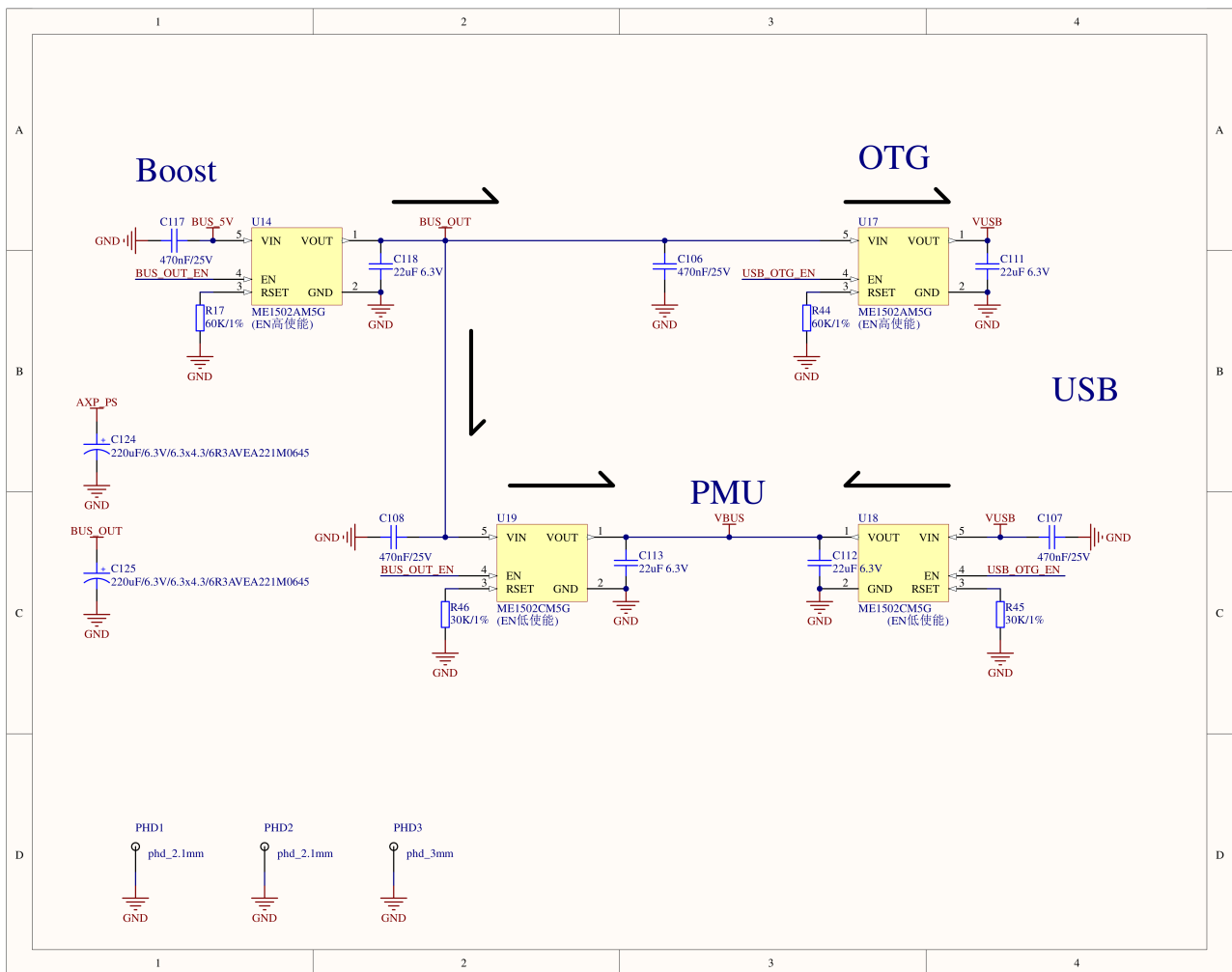
- [CoreS3 Schematics PDF](#)
- [Base DIN Schematics PDF](#)

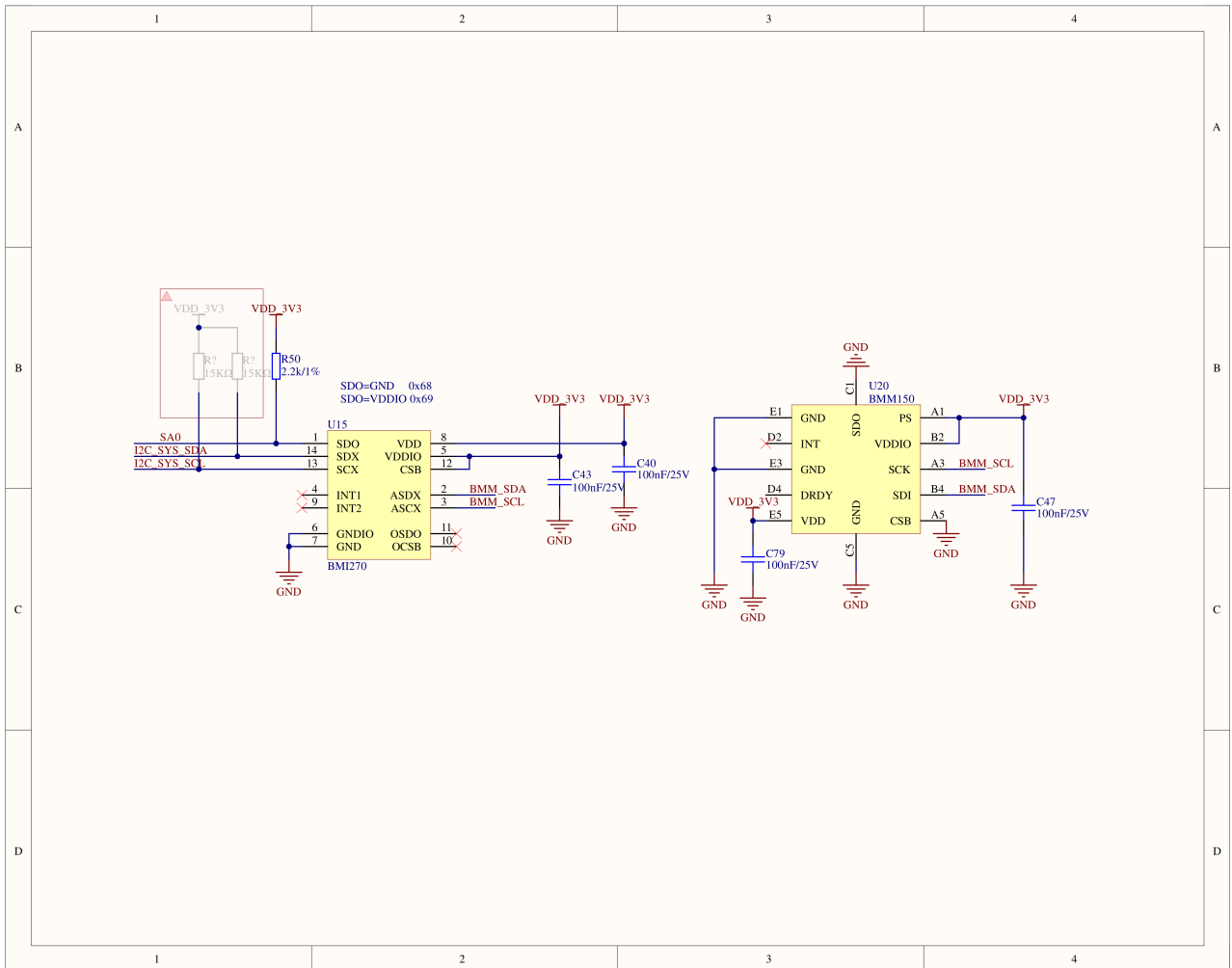


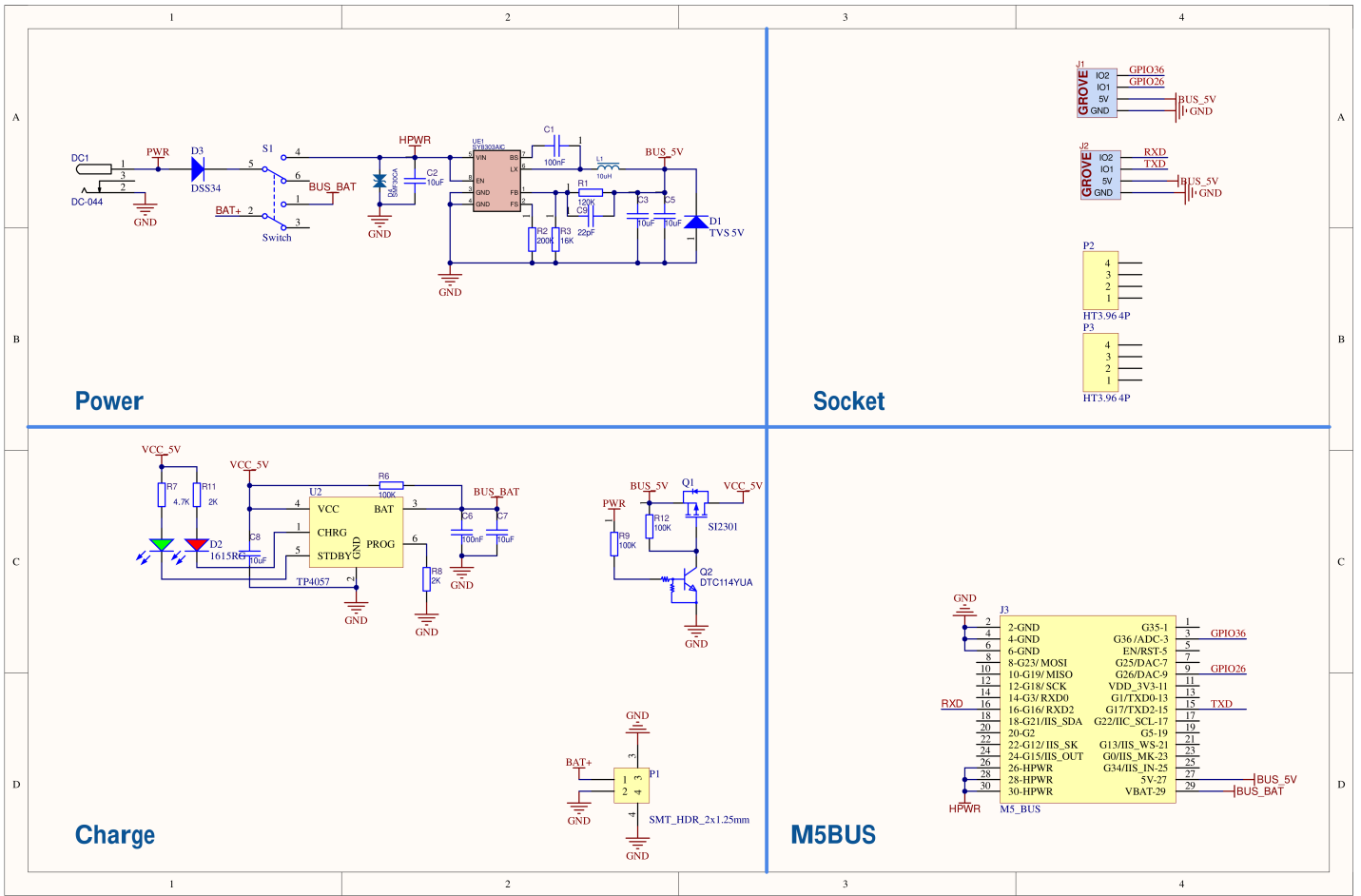












## PinMap

### LCD Screen

LCD Pixels: 320x240

ESP32-S3	G37	G36	G3	G35
ILI9342C	MOSI	SCK	CS	DC

AW9523B (0x58)	P1_1
ILI9342C	RST

AXP2101 (0x34)	DLDO1	LX1
ILI9342C	BL	PWR

### microSD

TF Card Maximum Supported Capacity: 16GB

ESP32-S3	G35	G37	G36	G4
TF Card	MISO	MOSI	SCK	CS

## Camera & Proximity Sensor LTR-553ALS-WA

ESP32-S3	G12	G11	G45	G46	G38
GC0308 (0x21)	I2C_SYS_SDA	I2C_SYS_SCL	CAM_PCLK	CAM_VSYNC	CAM_HREF
LTR-553ALS-WA (0x23)	I2C_SYS_SDA	I2C_SYS_SCL			

AW9523B	P1_0
GC0308	CAM_RST

The LTR-553ALS-WA proximity sensor and the camera are integrated on one ribbon cable, and use I2C for communication. Please refer to the table above for detailed communication addresses.

## GC0308

接口	Camera Pin	ESP32-S3
SCCB Clock	SIOC	G11
SCCB Data	SIOD	G12
System Clock	XCLK	-1
Vertical Sync	VSYNC	G46
Horizontal Reference	HREF	G38
Pixel Clock	PCLK	G45
Pixel Data Bit 0	D0	G39
Pixel Data Bit 1	D1	G40
Pixel Data Bit 2	D2	G41
Pixel Data Bit 3	D3	G42
Pixel Data Bit 4	D4	G15
Pixel Data Bit 5	D5	G16
Pixel Data Bit 6	D6	G48
Pixel Data Bit 7	D7	G47
Camera Reset	RESET	-1
Camera Power Down	PWDN	-1

## CAP.TOUCH

ESP32-S3	G12	G11
FT6336U (0x38)	I2C_SYS_SDA	I2C_SYS_SCL

AW9523B	P0_0	P1_2
FT6336U	TOUCH_RST	TOUCH_INT

## Microphone & Amplifier

ESP32-S3	G12	G11	G34	G33	G13	G14	G0
ES7210 (0x40)	I2C_SYS_SDA	I2C_SYS_SCL	I2S_BCK	I2S_WCK	I2S_DAT0		I2S_MCLK
AW88298 (0x36)	I2C_SYS_SDA	I2C_SYS_SCL	I2S_BCK	I2S_WCK		I2S_DAT1	

AW9523B	P0_2	P1_3
AW88298	AW_RST	AW_INT

## AXP Power Indicator Light

AXP2101	AXP_CHG_LED
Red LED	RTC_VDD

## RTC

ESP32-S3	G12	G11
BM8563 (0x51)	I2C_SYS_SDA	I2C_SYS_SCL

AXP2101	IRQ
BM8563	AXP_WAKEUP

## IMU (3-axis Gyroscope + 3-axis Accelerometer + 3-axis Magnetometer)

ESP32-S3	G12	G11
BMI270 (0x69)	I2C_SYS_SDA	I2C_SYS_SCL

## Internal I2C Connection

ESP32-S3	G12	G11
BMI270	I2C_SYS_SDA	I2C_SYS_SCL
AXP2101	I2C_SYS_SDA	I2C_SYS_SCL
BM8563	I2C_SYS_SDA	I2C_SYS_SCL
ES7210	I2C_SYS_SDA	I2C_SYS_SCL
AW88298	I2C_SYS_SDA	I2C_SYS_SCL

## BMM150

BMI270	BMI270_ASDx	BMI270_ASCx
BMM150 (0x10)	BMM_SDA	BMM_SCL

### BMM150 Mounted on BMI270

Connected through BMI270's Sensor Hub auxiliary I2C interface to access BMM150 and achieve unified 9-axis sensor data acquisition.

## HY2.0-4P

HY2.0-4P	Black	Red	Yellow	White
PORT.A	GND	5V	G2	G1
PORT.B	GND	5V	G9	G8
PORT.C	GND	5V	G17	G18

## CoreS3 M5-Bus Diagram

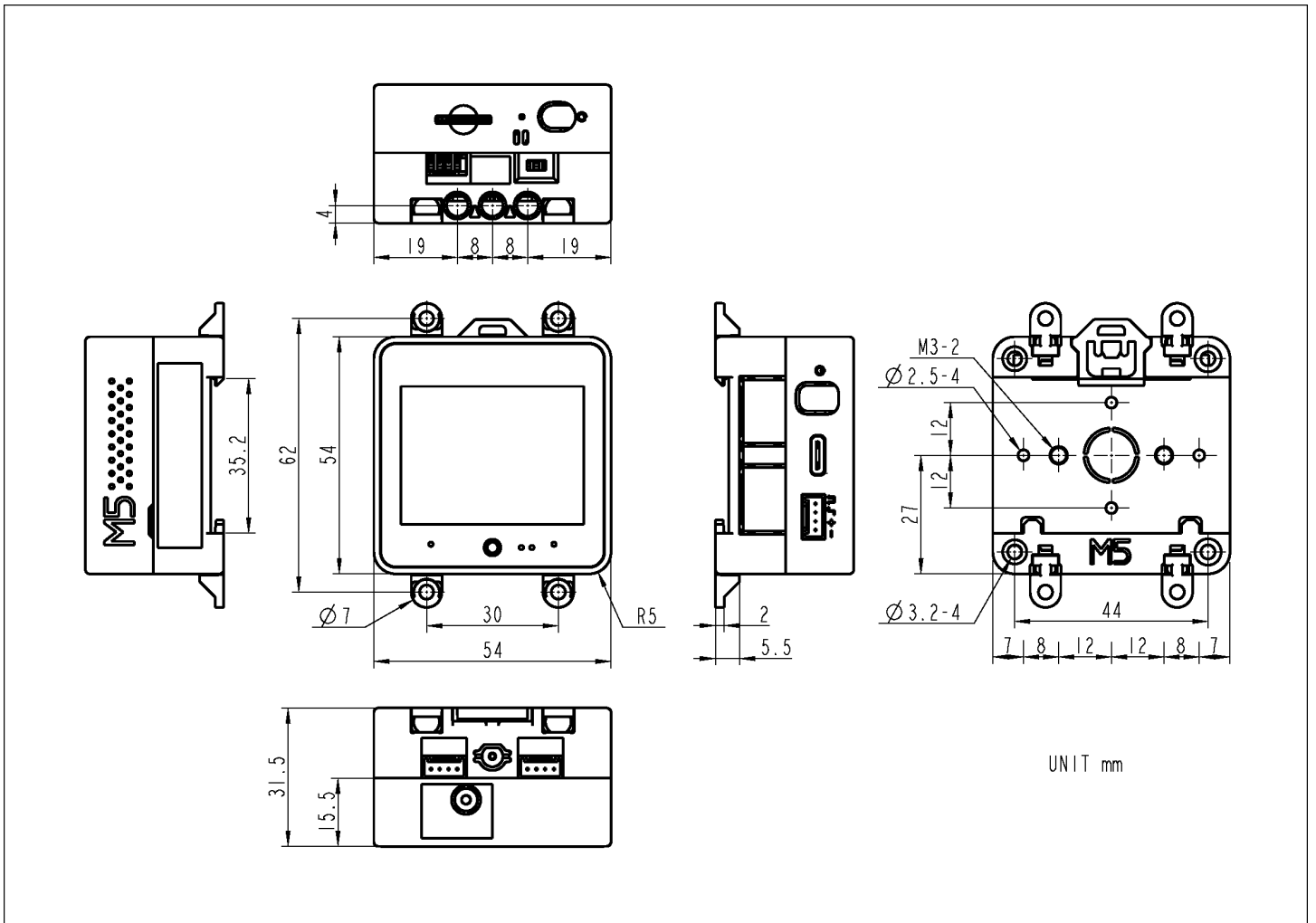
FUNC	PIN	LEFT	RIGHT	PIN	FUNC
	GND	1	2	G10	ADC
	GND	3	4	G8	PB_IN
	GND	5	6	RST	EN
MOSI	G37	7	8	G5	GPIO
MISO	G35	9	10	G9	PB_OUT
SCK	G36	11	12	3V3	
RXD0	G44	13	14	G43	TXD0
PC_RX	G18	15	16	G17	PC_TX
Int SDA	G12	17	18	G11	Int SCL
PORT.A SDA	G2	19	20	G1	PORT.A SCL
GPIO	G6	21	22	G7	GPIO
I2S_DOUT	G13	23	24	G0	I2S_LRCK
	HVIN(Base DIN)	25	26	G14	I2S_DIN
	HVIN(Base DIN)	27	28	5V	
	HVIN(Base DIN)	29	30	BAT	

## Core Series PinMap Comparison

CoreMP135_Bus																	
M5CORES3_Bus																	
M5CORE2_Bus																	
M5Basic_Bus																	
GND	GND	GND	GND	GND	GND	GND	GND	1	2	ADC	G35	ADC	G35	ADC	G10	GPIO	PA0
GND	GND	GND	GND	GND	GND	GND	GND	3	4	ADC	G36	ADC	G36	PB_IN	G8	PB_IN	PD3
GND	GND	GND	GND	GND	GND	GND	GND	5	6	RST_EN		RST_EN		RST_EN		AXP-PWR-OK	
PE11	SPI4MO	G37	MOSI	G23	MOSI	G23	MOSI	7	8	DAC/SPK	G25	DAC	G25	GPIO	G5	GPIO	PB13
PE13	SPI4MI	G35	MISO	G38	MISO	G19	MISO	9	10	DAC	G26	DAC	G26	PB_OUT	G9	PB_OUT	PE9
PB4	SPI4SCK	G36	SCK	G18	SCK	G18	SCK	11	12	3.3V		3.3V		3.3V		3.3V	
PH8	U2RX	G44	RXD0	G3	RXD0	G3	RXD0	13	14	TXD0	G1	TXD0	G1	TXD0	G43	U2TX	PF11
DS-USB1-N		G18	PC_RX	G13	RXD2	G16	RXD2	15	16	TXD2	G17	TXD2	G14	PC_TX	G17	DS-USB1-P	
PE8	I2C1-SDA	G12	intSDA	G21	intSDA	G21	intSDA	17	18	intSCL	G22	intSCL	G22	intSCL	G11	I2C1-SCL	PB8
PG9	I2C2-SDA	G2	PA_SDA	G32	PA_SDA	G2	GPIO	19	20	GPIO	G5	PA_SCL	G33	PA_SCL	G1	I2C2-SCL	PF2
PA6	GPIO	G6	GPIO	G27	GPIO	G12	I2S_SK	21	22	I2S_WS	G13	GPIO	G19	GPIO	G7	GPIO	PB10
PA5	GPIO	G13	I2S_DOUT	G2	I2S_DOUT	G15	I2S_DOUT	23	24	I2S_MK	G0	I2S_LRCK/PDM_CLK	G0	I2S_LRCK	G0	GPIO	PC13
NC	NC	NC	NC	NC	NC	NC	NC	25	26	I2S_DIN	G34	PDM_DAT	G34	I2S_DIN	G14	GPIO	PA1
NC	NC	NC	NC	NC	NC	NC	NC	27	28	5V		5V		5V		5V	
NC	NC	NC	NC	NC	NC	NC	NC	29	30	BAT		BAT		BAT		BAT	

## Model Size

- Core3 Model Size DXF



## PCB

- o [Cores3 PcbDoc](#)

### Description

This file can be used for DIY adaptation of CoreS3 Module Type A expansion modules.

## Datasheets

- o [ESP32-S3](#)
- o [LTR-553ALS-WA](#)
- o [GC0308](#)
- o [ES7210](#)
- o [BMM150](#)
- o [BMI270](#)
- o [BM8563](#)
- o [AXP2101](#)
- o [AW88298](#)
- o [AW9523B](#)

# Softwares

## Quick Start

- [CoreS3 OpenAI Voice Assistant](#)
- [CoreS3 XiaoZhi Voice Assistant](#)
- [CoreS3 HA Voice Assistant](#)

## Arduino

- [CoreS3 Arduino Quick Start](#)
- [CoreS3 Arduino Library](#)
- [CoreS3 Arduino M5Unified Library](#)
- [CoreS3 Arduino M5GFX Library](#)

## UiFlow2

- [CoreS3 UiFlow2 Quick Start](#)
- [CoreS3 UiFlow2 Book](#)

## PlatformIO

- [CoreS3 Factory Firmware](#)

```
[env:m5stack-cores3]
platform = espressif32@6.7.0
board = esp32-s3-devkitc-1
framework = arduino
upload_speed = 1500000
monitor_speed = 115200
build_flags =
  -DESP32S3
  -DBOARD_HAS_PSRAM
  -mfix-esp32-psram-cache-issue
  -DCORE_DEBUG_LEVEL=5
  -DARDUINO_USB_CDC_ON_BOOT=1
  -DARDUINO_USB_MODE=1
lib_deps =
  M5Unified=https://github.com/m5stack/M5Unified
```

## ESP-IDF

- [Espressif's Board Support Packages – CoreS3](#)
- [CoreS3 ESP-IDF BSP Guide](#)

## Easyloader

Easyloader	Download	Note
<a href="#">CoreS3 Factory Firmware Easyloader</a>	<a href="#">download</a>	/

## Other

- [CoreS3 Restore Factory Firmware Guide](#)
- [I2C Address Table](#)

Chip	ADDRESS
AW88298	0x36
AW9523	0x58
AXP2101	0x34
BM8563	0x51
BMI270	0x69
BMM150	0x10
ES7210	0x40
FT6336	0x38
GC0308	0x21
LTR553	0x23

## Video

[cores3.mp4](#)

- [How to Program with USB in UiFlow2](#)

[How to use USB port execute code on UIFlow 2.0.mp4](#)

- [Flash UIFlow2x to CoreS3](#)

[Burning UIFlow2x to CoreS3-ch.mp4](#)

## Product Comparison

## Hardware Peripheral



CoreS3-Lite

CoreS3

CoreS3-SE

Hardware Peripheral	CoreS3-Lite	CoreS3	CoreS3-SE
Camera (GC0308)	✓	✓	✗
Proximity Sensor (LTR-553ALS-WA)	✓	✓	✗
IMU (BMI270)	✓	✓	✗
Compass (BMM150)	✓	✓	✗
RTC	✓	✓	✓
Microphone	✓	✓	✓
Speaker	✓	✓	✓
PMIC (AXP2101)	✓	✓	✓
16 MB Flash & 8 MB PSRAM	✓	✓	✓
Touch	✓	✓	✓
Back Cover	Cover For CoreS3	Base DIN	✗
Battery Capacity	200 mAh	500 mAh	✗

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.