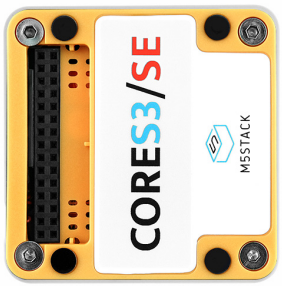
CoreS3-SE

SKU:K128-SE



Description

CoreS3-SE is a lightweight version of the third-generation CoreS3 main controller in the M5Stack development kit series. It is powered by the ESP32-S3 solution, featuring a dual-core Xtensa LX7 processor with a main frequency of 240 MHz, and integrates (2.4G) Wi-Fi connectivity. The board is equipped with 16MB Flash and 8MB PSRAM. Programs can be downloaded via the USB Type-C interface, which supports OTG and CDC functions, making it convenient for connecting external USB devices and flashing firmware.

The front side features a 2.0-inch capacitive touch IPS display, with a panel made of high-strength glass material. The power system uses the AXP2101 power management chip along with four power path control circuits, adopting an overall low-power design. A built-in microSD card slot is included. The board integrates a BM8563 RTC chip, providing accurate timekeeping and sleep–timed wake-up functions.

For audio output, it uses a high-fidelity 16-bit I2S amplifier chip AW88298, with a built-in 1W speaker. Audio input is handled by an ES7210 audio codec chip combined with dual-microphone input. On the side of the device, there are independent power and reset (RST) buttons, along with a built-in delay circuit; long-pressing the reset button allows entry into program download mode. This finished product is suitable for IoT development, various DIY projects, smart home control systems, and industrial automation control systems.

Tutorial

UiFlow2

This tutorial will show you how to control the CoreS3-SE device through the UiFlow2 graphical programming platform

Arduino IDE

This tutorial introduces how to program and control the CoreS3-SE device using Arduino IDE.

Features

- Based on ESP32-S3 development, supports Wi-Fi @16MB Flash, 8MB PSRAM
- Speaker, dual microphones

- Capacitive touch screen
- microSD card slot
- High-strength glass panel
- Supports OTG and CDC functionality
- Uses AXP2101 power management, with a low power consumption design
- Development Platform
  - UiFlow2
  - Arduino IDE
  - ESP-IDF
  - PlatformIO

Includes

- 1 × CoreS3-SE
- 1 × Hex Key L-Shape 2.0mm (For M2.5 Screw)

Applications

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

Specifications

Specification	Parameter
SoC	ESP32-S3@Xtensa LX7 Dual-Core, 240MHz
USB	USB OTG, USB Serial/JTAG
Flash	16MB
PSRAM	8MB
Wi-Fi	2.4 GHz Wi-Fi
Touch	FT6336U@Capacitive touch, touch area pixels 320 x 280
LCD Screen	2.0"@320 x 240 ILI9342C, SPI communication
Power Management Chip	AXP2101
RTC	BM8563
Speaker	1W@9028
Amplifier	16bits-I2S amplifier chip AW88298
Audio Decoder Chip	ES7210, Dual-microphone input
BUS Pins	G0/G1/G2/G5/G6/G7/G8/G9/G10/G11/G12/G13/G14/G17/G18/G35/G36/G37/G43/G44
Lithium Battery Charging Current	5V@198mA
Max Grove Output Current (Battery Power)	DC 4.2V@940mA
Max Grove Output Current (USB Power)	DC 5V@680mA
Operating Temperature	0 ~ 40°C
Power Consumption	Battery Power: Standby Mode: DC 4.2V@104.64uA; Working Mode: DC 4.2V@109.67mA USB Power: Working Mode: DC 5V@166.27mA
Product Size	54.0 x 54.0 x 15.5mm
Product Weight	37.8g
Package Size	133.0 x 93.5 x 22.5mm
Gross Weight	54.5g

Learn

Download Mode

Download Mode

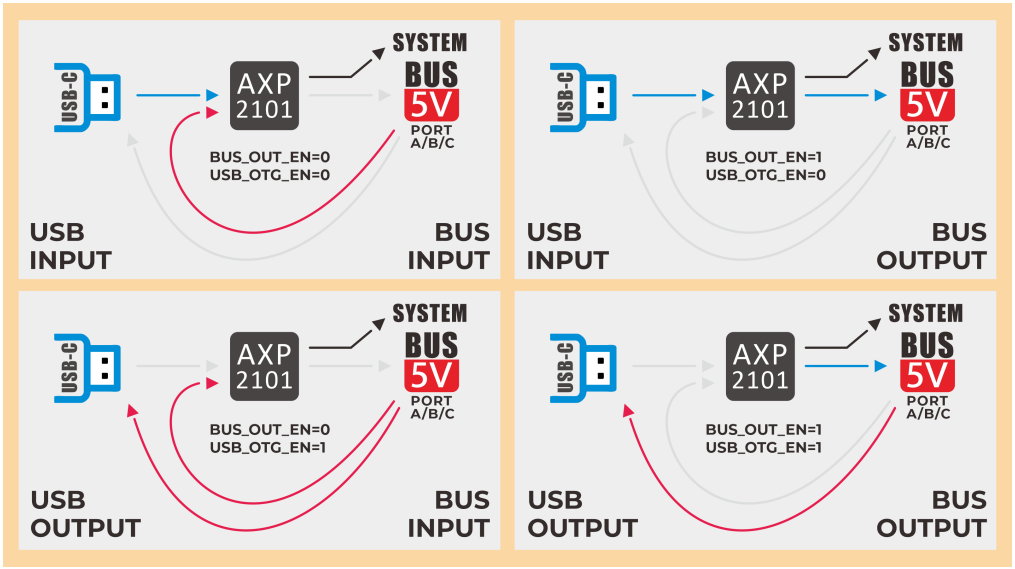
Before downloading the program, press and hold the reset button for 3 seconds (green light) to enter download mode.

Power On/Off

- Power On: Click the left power button
- Power Off: Press and hold the left power button for 6 seconds①
- Reset: Click the bottom RST reset button②

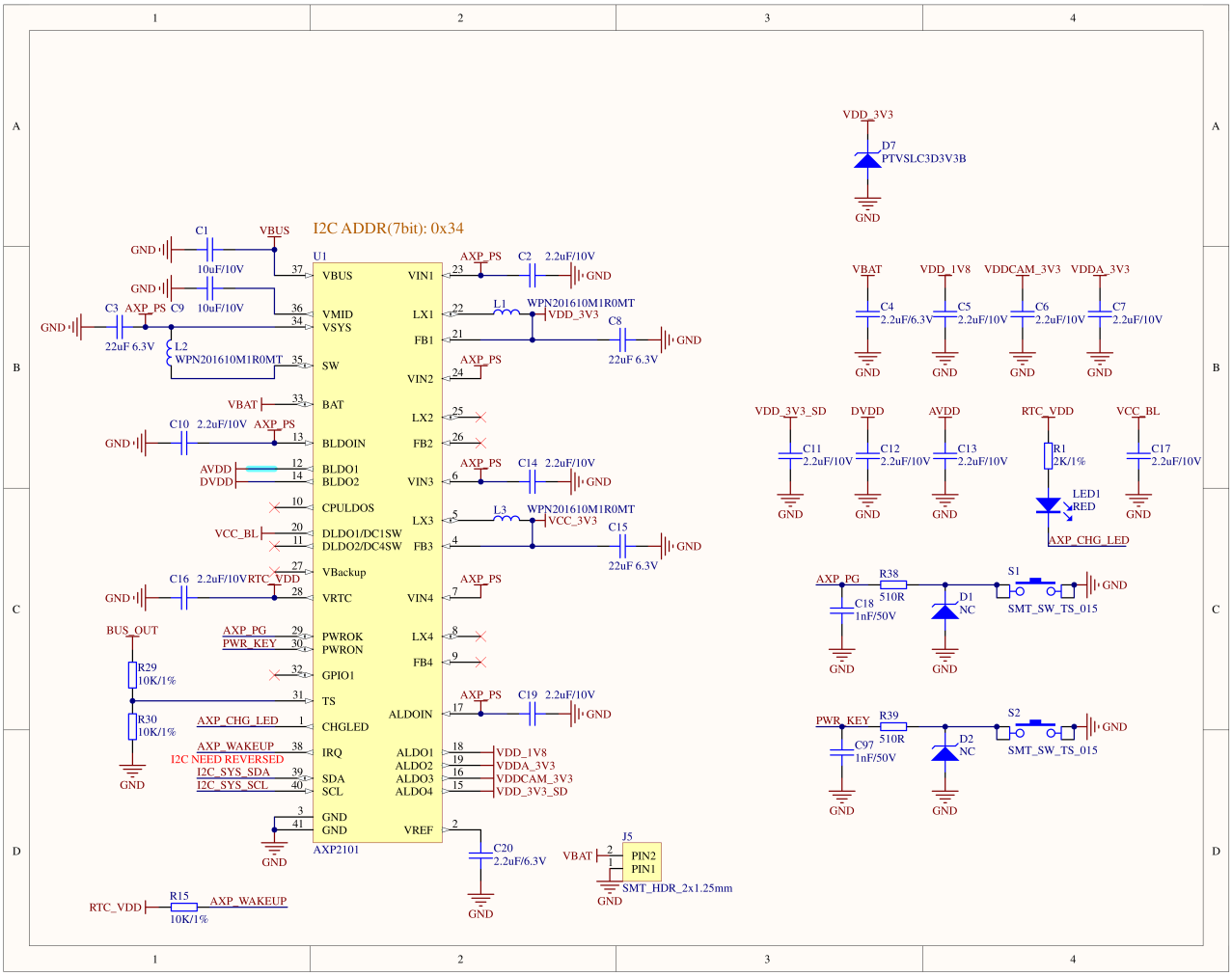
Power Management

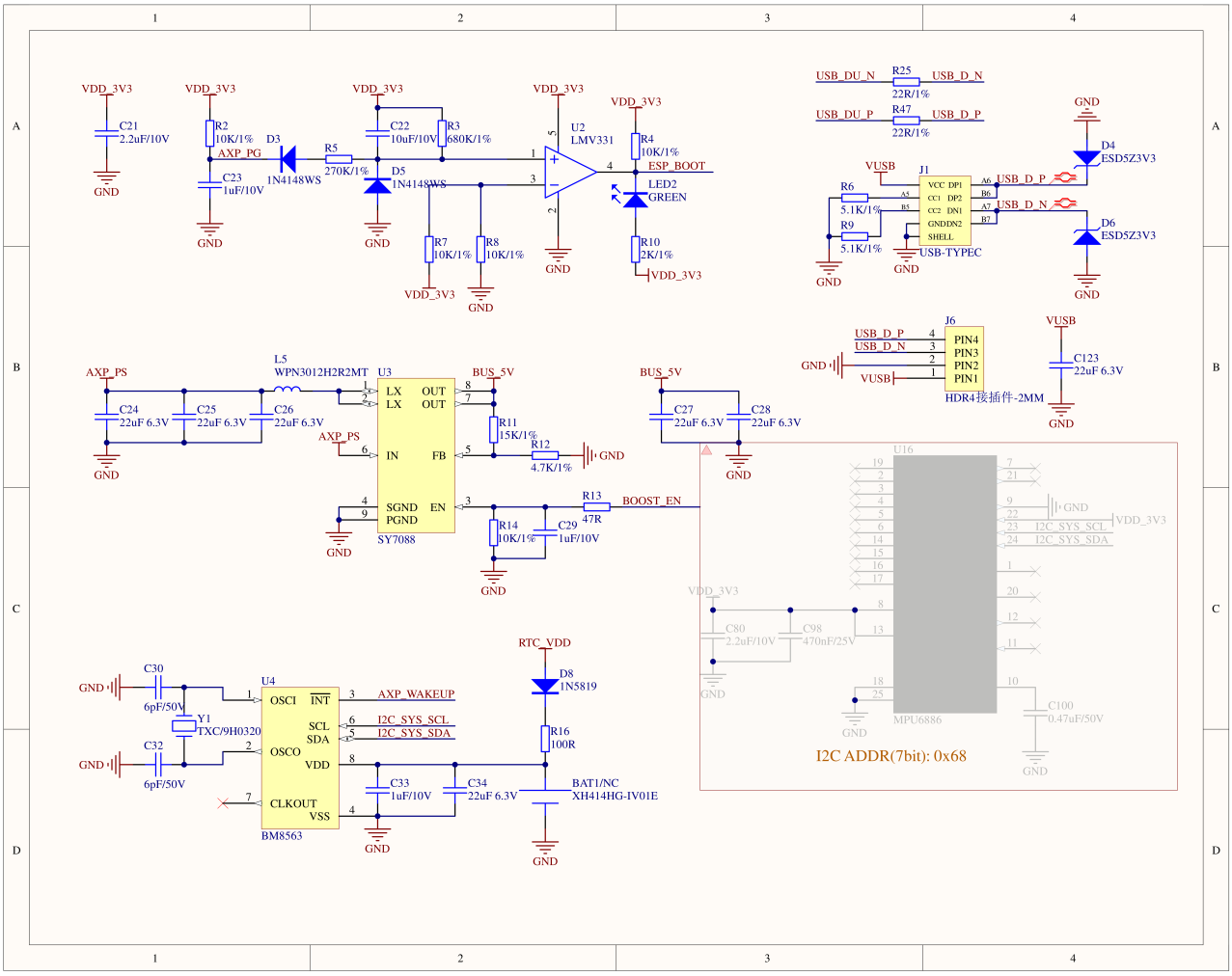
CoreS3-SE uses the AXP2101 power management chip together with the AW9523B IO expansion chip to control the direction of power input and output. Please refer to the pin states of `BUS_OUT_EN` and `USB_OTG_EN` below to set the power input and output directions. For specific settings, please refer to CoreS3 Power Management Example.

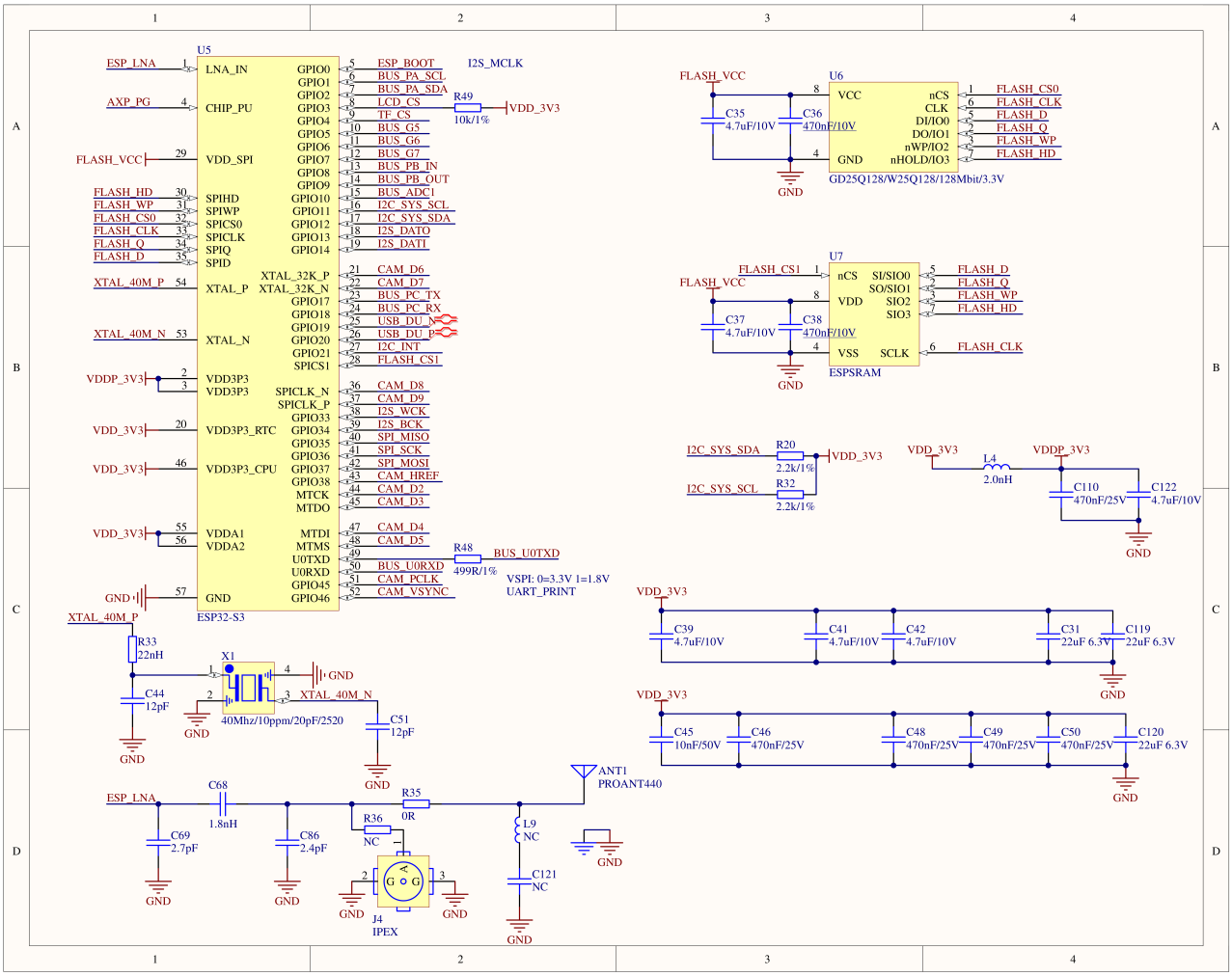


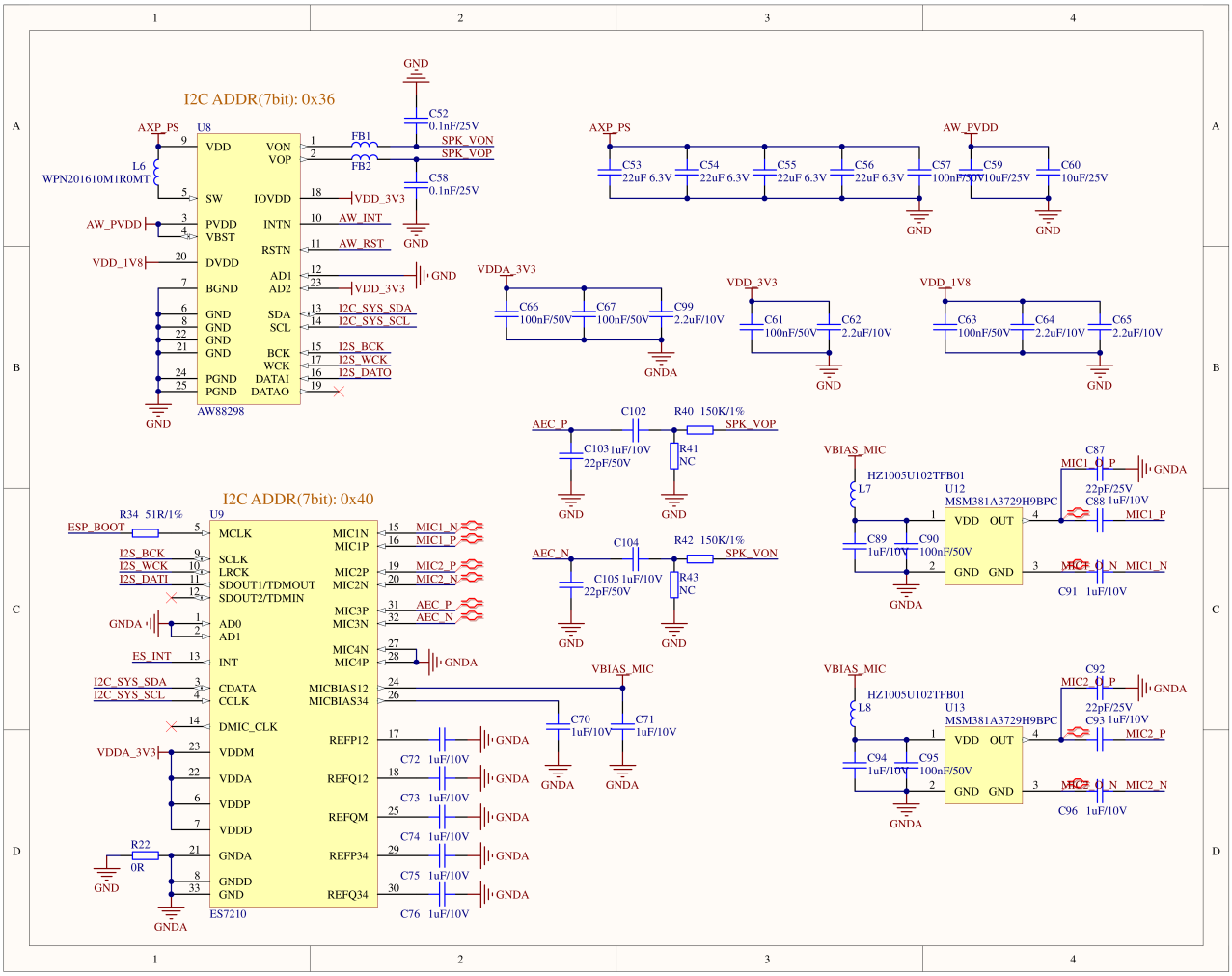
Schematics

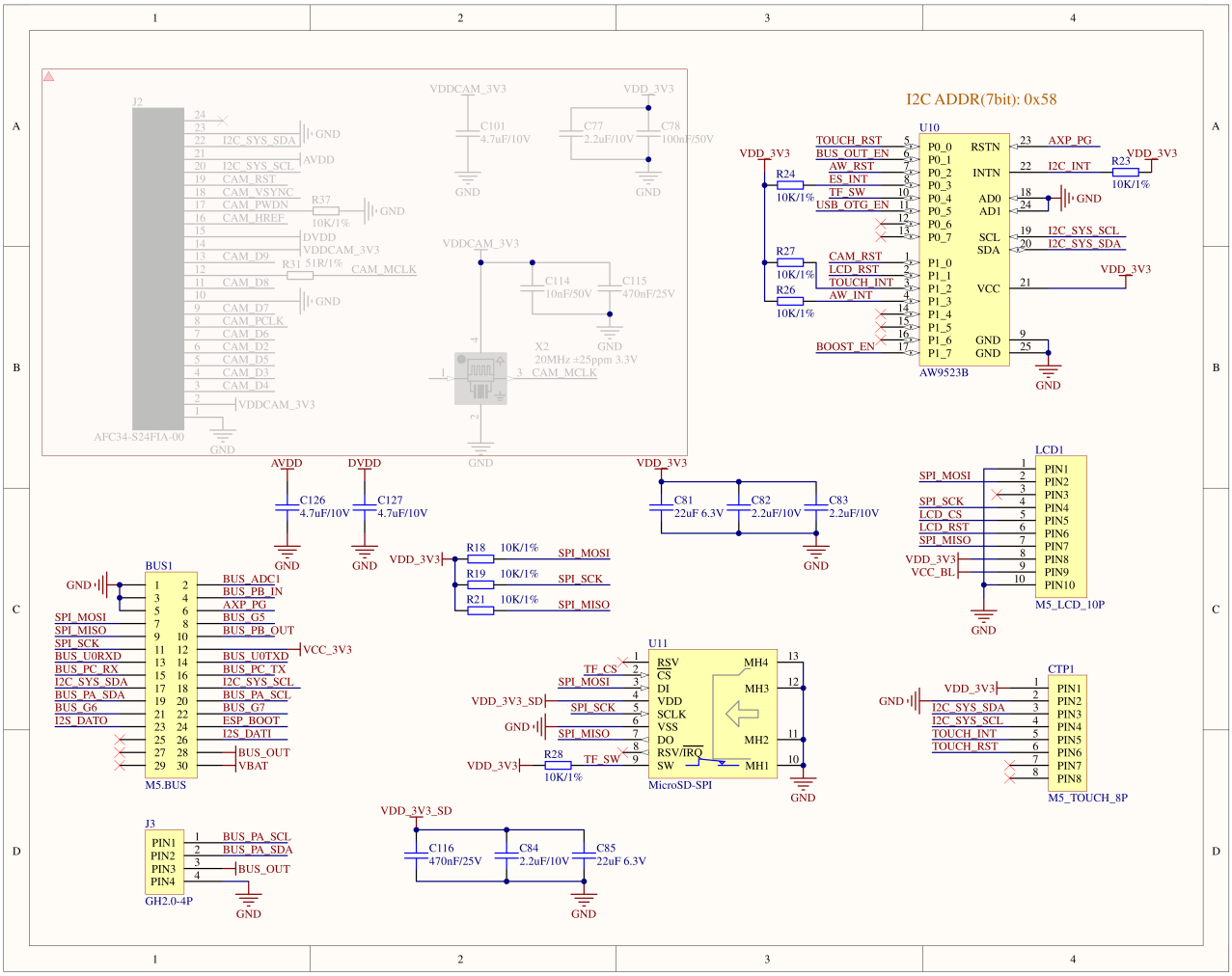
- CoreS3-SE Schematics PDF

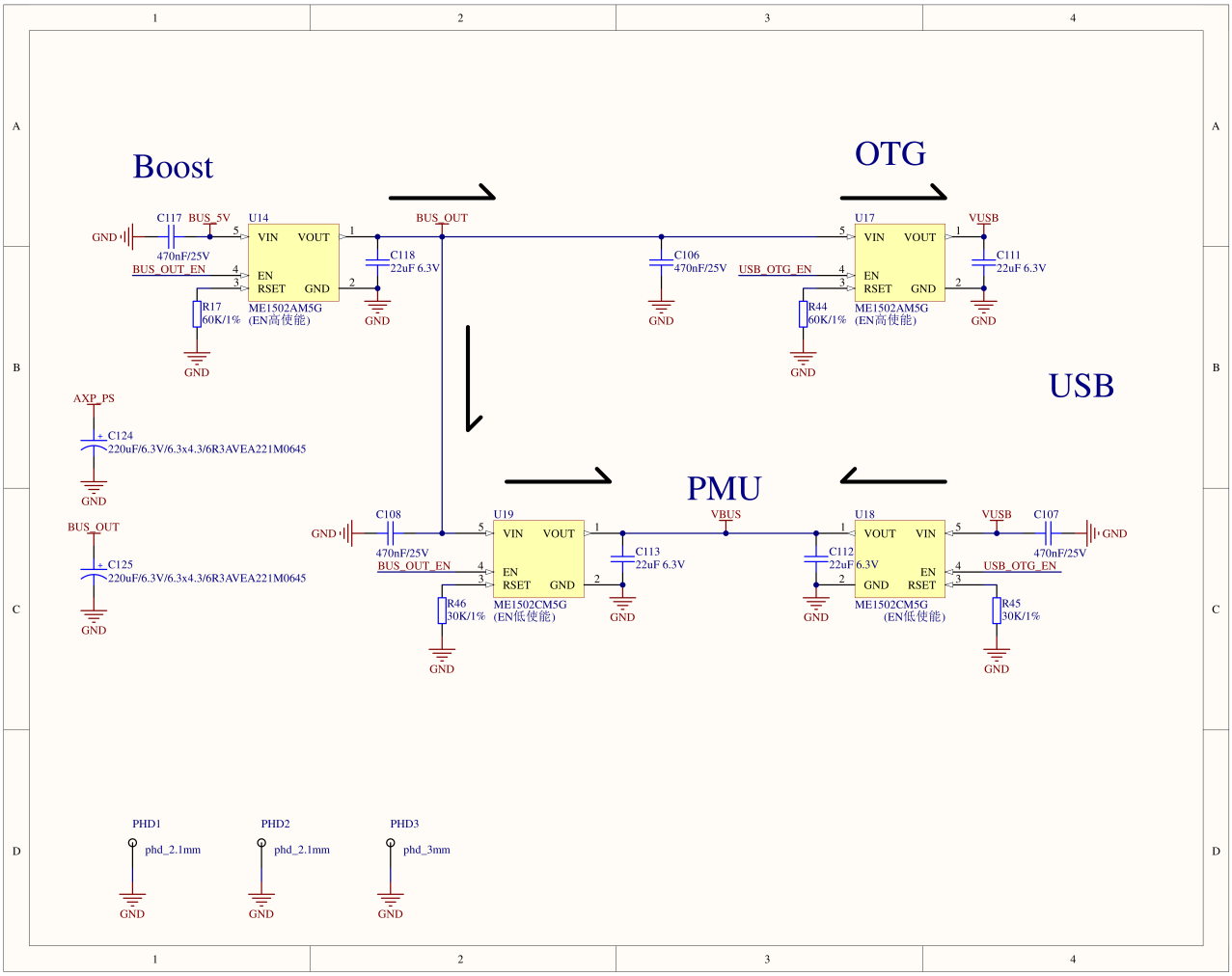

I2C ADDR(7bit): 0x34
U1
AXP2101
VBUS
VMID
VSYS
SW
BAT
BLDOIN
BLDO1
BLDO2
CPULDOS
DLDO1/DC1SW
DLDO2/DC4SW
VBackup
VRTC
PWROK
PWRON
GPIO1
TS
CHGLED
IRQ
SDA
SCL
GND
GND
VIN1
LX1
FB1
VIN2
LX2
FB2
VIN3
LX3
FB3
VIN4
LX4
FB4
ALDOIN
ALDO1
ALDO2
ALDO3
ALDO4
VREF
I2C NEED REVERSED
VDD_3V3
D7
PTVSLC3D3V3B
VBAT
VDD_1V8
VDDCAM_3V3
VDDA_3V3
VDD_3V3_SD
DVDD
AVDD
RTC_VDD
VCC_BL
LED1
RED
AXP_CHG_LED
AXP_PG
SMT_SW_TS_015
PWR_KEY
J5
PIN2
PIN1
SMT_HDR_2x1.25mm

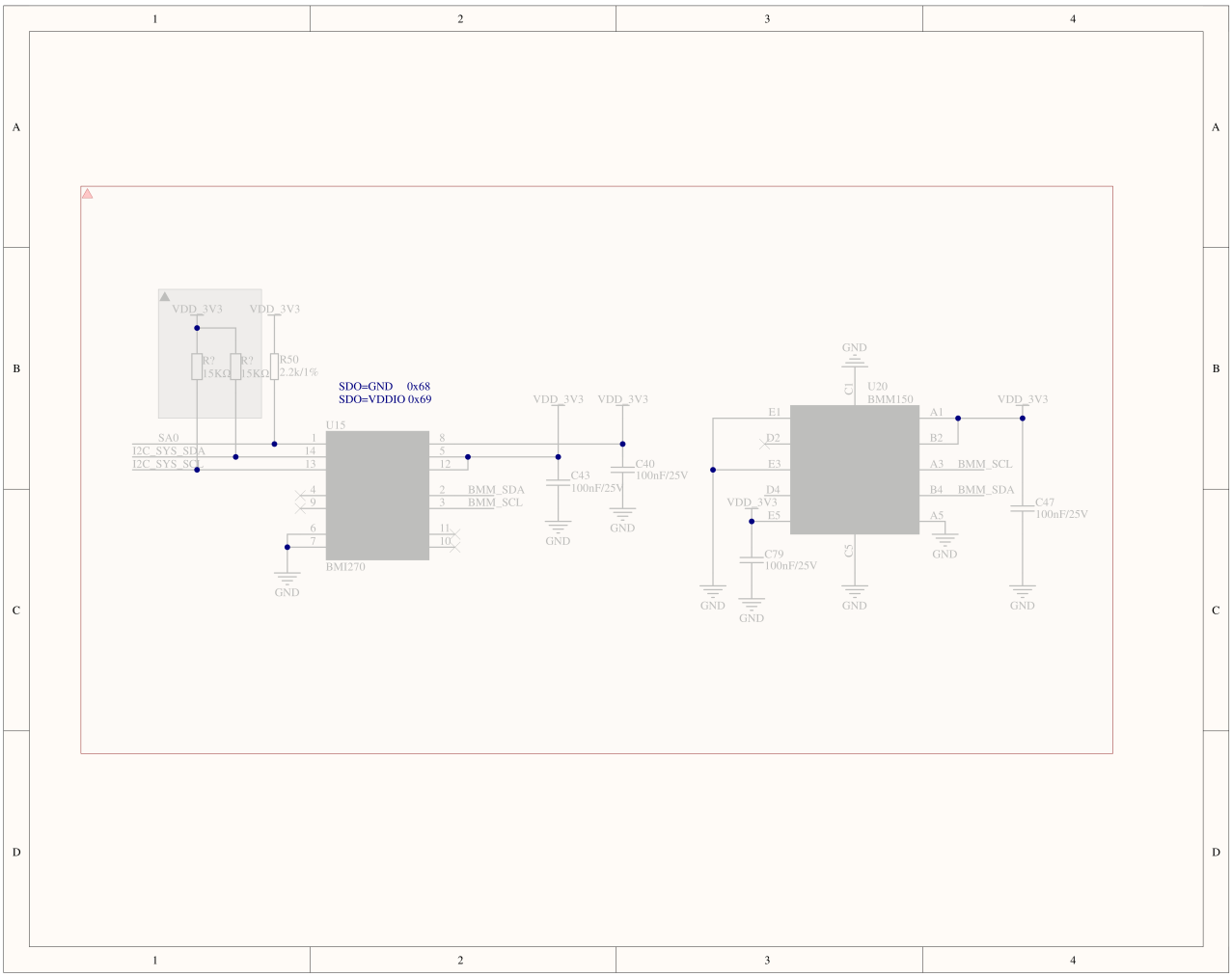

VDD_3V3
U2
LMV331
ESP_BOOT
LED2
GREEN
USB_DU_N
USB_DU_P
USB_D_N
USB_D_P
VUSB
USB-TYPEC
D4
ESD5Z3V3
D6
ESD5Z3V3
J6
HDR4接插件-2MM
C123
22uF 6.3V
L5
WPN3012H2R2MT
U3
SY7088
BUS_5V
AXP_PS
BOOST_EN
U16
MPU6886
I2C ADDR(7bit): 0x68
U4
BM8563
RTC_VDD
D8
1N5819
BAT1/NC
XH414HG-IV01E


U5
ESP32-S3
U6
GD25Q128/W25Q128/128Mbit/3.3V
U7
ESPSRAM
J4
IPEX
ANT1
PROANT440
X1
40Mhz/10ppm/20pF/2520
I2S_MCLK
VSPI: 0=3.3V 1=1.8V
UART_PRINT


I2C ADDR(7bit): 0x36
AW88298
I2C ADDR(7bit): 0x40
ES7210
GND
GNDA
AXP_PS
AW_PVDD
VDD_1V8
VDD_3V3
VDDA_3V3
VBIAS_MIC
SPK_VON
SPK_VOP
AEC_P
AEC_N
I2S_BCK
I2S_WCK
I2S_DATI
I2S_DATO
I2C_SYS_SDA
I2C_SYS_SCL
ES_INT
ESP_BOOT
MIC1_N
MIC1_P
MIC2_N
MIC2_P
HZ1005U102TFB01
MSM381A3729H9BPC


I2C ADDR(7bit): 0x58
J2
AFC34-S24FIA-00
VDDCAM_3V3
VDD_3V3
C101 4.7uF/10V
C77 2.2uF/10V
C78 100nF/50V
C114 10nF/50V
C115 470nF/25V
X2 20MHz ±25ppm 3.3V
R37 10K/1%
R31 51R/1%
U10
AW9523B
R24 10K/1%
R27 10K/1%
R26 10K/1%
R23 10K/1%
C126 4.7uF/10V
C127 4.7uF/10V
AVDD
DVDD
C81 22uF 6.3V
C82 2.2uF/10V
C83 2.2uF/10V
R18 10K/1%
R19 10K/1%
R21 10K/1%
BUS1
M5.BUS
LCD1
M5_LCD_10P
U11
MicroSD-SPI
R28 10K/1%
CTP1
M5_TOUCH_8P
J3
GH2.0-4P
C116 470nF/25V
C84 2.2uF/10V
C85 22uF 6.3V
GND


Boost
OTG
USB
PMU
C117
BUS_5V
U14
VIN
VOUT
EN
RSET
GND
470nF/25V
BUS_OUT_EN
R17
60K/1%
ME1502AM5G
(EN高使能)
BUS_OUT
C118
22uF 6.3V
C106
470nF/25V
U17
USB_OTG_EN
R44
60K/1%
VUSB
C111
22uF 6.3V
AXP_PS
C124
220uF/6.3V/6.3x4.3/6R3AVEA221M0645
C125
220uF/6.3V/6.3x4.3/6R3AVEA221M0645
C108
U19
C113
22uF 6.3V
R46
30K/1%
ME1502CM5G
(EN低使能)
VBUS
U18
C112
22uF 6.3V
R45
30K/1%
C107
470nF/25V
PHD1
phd_2.1mm
PHD2
phd_2.1mm
PHD3
phd_3mm



PinMap

LCD Screen & microSD

LCD pixels: 320x240

microSD Capacity Requirement

microSD card supports up to 16GB.

ESP32-S3	G37	G36	G3	G35	G4
ILI9342C	MOSI	SCK	CS	DC	
TF Card	SPI_MOSI	SPI_SCK		SPI_MISO	TF_CS

AW9523B (0x58)	P1_1
ILI9342C	LCD_RST

AXP2101 (0x34)	DCDO1	LX1
ILI9342C	BL	PWR

CAP.TOUCH

ESP32-S3	G12	G11	AW9523B_P1_2	AW9523B_P0_0
FT6336U (0x38)	I2C_SYS_SDA	I2C_SYS_SCL	TOUCH_INT	TOUCH_RST

ESP32-S3	G12	G11
FT6336U	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_DATO		I2S_MCLK
AW88298 (0x36)	I2C_SYS_SDA	I2C_SYS_SCL	I2S_BCK	I2S_WCK		I2S_DATI	

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

Internal I2C Connection

ESP32-S3	G12	G11
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

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	G18	G17

CoreS3-SE M5-Bus Diagram

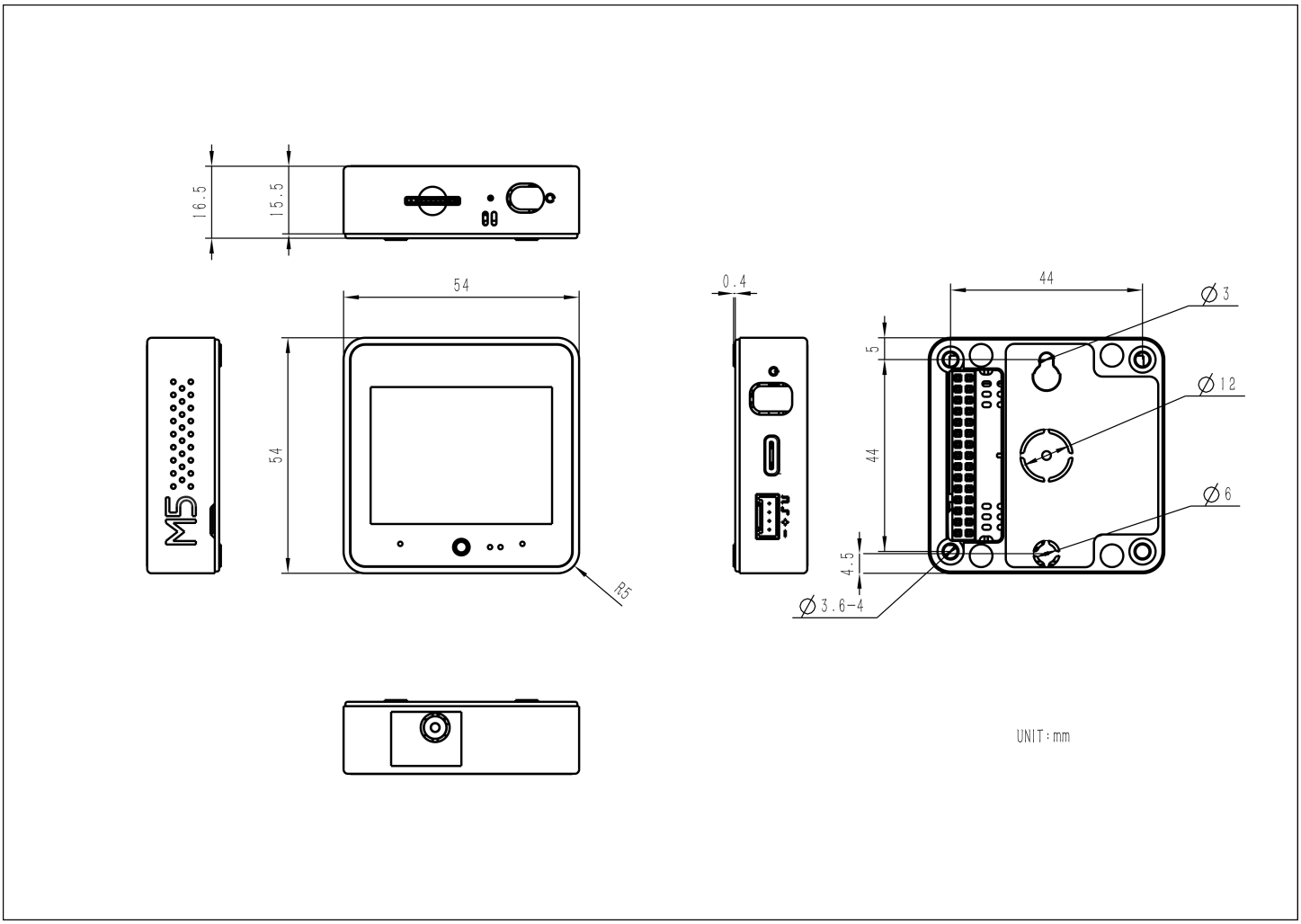
FUNC	PIN	LEFT	RIGHT	PIN	FUNC
	GND	1	2	G10	ADC
	GND	3	4	G8	PB_IN
	GND	5	6	RST	EN
MOSI	G37	7	8	G5	GPIO
MISO	G35	9	10	G9	PB_OUT
SCK	G36	11	12	3V3	
RXD0	G44	13	14	G43	TXD0
PC_RX	G18	15	16	G17	PC_TX
Int SDA	G12	17	18	G11	Int SCL
PORT.A SDA	G2	19	20	G1	PORT.A SCL
GPIO	G6	21	22	G7	GPIO
I2S_DOUT	G13	23	24	G0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

Core Series Host PinMap Comparison

CoreMP135_Bus		M5CORES3_Bus/M5CORES3_SE_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		25	26	I2S_DIN	G34	PDM_DAT	G34	I2S_DIN	G14	GPIO	PA1
NC		NC		NC		NC		27	28	5V		5V		5V		5V	
NC		NC		NC		NC		29	30	BAT		BAT		BAT		BAT	

Model Size

CoreS3-SE Model Size PDF



Datasheets

- esp32-s3
- ES7210
- BM8563
- AXP2101
- AW88298
- AW9523B

Softwares

Quick Start

- CoreS3-SE OpenAI Voice Assistant
- CoreS3-SE Xiaozhi Voice Assistant

Arduino

Note

There are hardware differences between CoreS3-SE and CoreS3. Code sections in the library involving Camera, Proximity sensor, IMU, and Magnetometer are not compatible with CoreS3-SE.

- CoreS3-SE Arduino Quick Start
- CoreS3-SE Arduino Library

UiFlow2

- CoreS3-SE UiFlow2 Quick Start

PlatformIO

- CoreS3-SE Factory Firmware (pio)

Easyloader

Easyloader	Download	Note
CoreS3-SE Factory Firmware Easyloader	download	/

Video

- CoreS3-SE Feature Introduction

K128-SE M5CoreS3 SE 视频.mp4

Product Comparison

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	Cover For CoreS3
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.