SMART DISPLAY MODULE SPECIFICATION

2.1 Inch Smart Knob Display with Wi-Fi /BLE	
Model:	UEDX48480021-MD80E
Version:	V3.2
Date:	2024-08-07

Customer Confirmation 客户确认

Approved by	Notes

REVISION HISTORY

Revision	Date	Contents of Revision Change	Remark
V1.0	20221014	Preliminary release	
V2.0	20240218	Change to English version	
V3.0	20240730	Add schemata, GitHub project links, and environment configuration links	
V3.1	20240807	Upgrade mechanical drawing	
V3.2	20240807	GitHub links to required libraries for Arduino	
V3.3	20241112	Add more hardware details and link to LCD specification	

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1. Introduction

1.1 Features

Brief Info:

1) Outline Dimension: ϕ80 Round
2) Interaction Method: Rotate and Press
3) Shell Color: Black/White/Silver/Customized
4) Power: DC 5V, 1A

System

1) OS: RTOS
2) CPU: ESP32-S3 240Mhz
3) RAM: 8MB
4) Flash: 16MB
5) Interface: UART/USB
6) Support 2.4GHz Wi-Fi、BLE 5、BLE Mesh
7) Support Peripherals:
   GPIO, SPI, LCD interface, Camera interface, UART, I2C, I2S, remote control, pulse counter,LED PWM, full-speed USB 2.0 OTG, USB Serial/JTAG controller, MCPWM, SDIO host, GDMA, TWAI® controller (compatible with ISO 11898-1), ADC, touch sensor, temperature sensor, timers and watchdogs

For more information on ESP32-S3-WROOM-1, please refer to the following link:datasheet_cn.pdf

Display

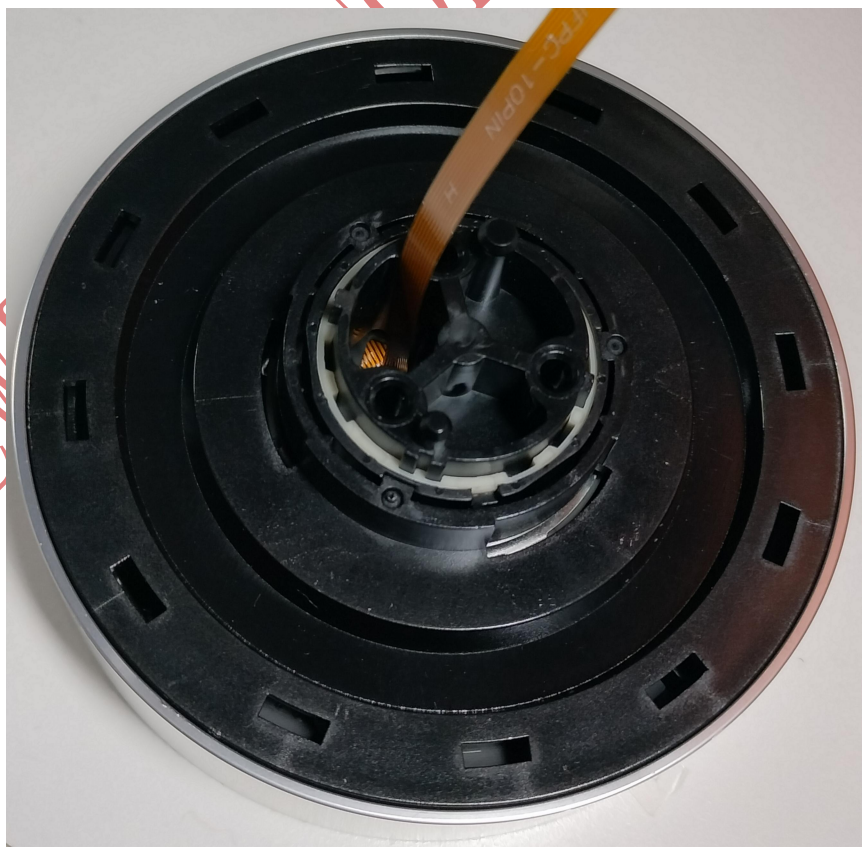
1) Size: 2.1 Inch
2) Resolution: 480*480
3) Mode: IPS
4) Pixel Arrangement：RGB Vertical Stripe
5) Interface Mode：3 Wire SPI-RGB 24bits
6) Driver IC： GC9503CV
7) Brightness: 300 cd/m^2
8) Backlight Type： White LED
9) Display mode： Normally Black,
10) Pixel Density： 323 PPI
11) Touch: without

More information about Display can be found here:display datasheet

Other

1) Operation Temperature：-20~70℃
2) Storage Temperature：-30~80℃

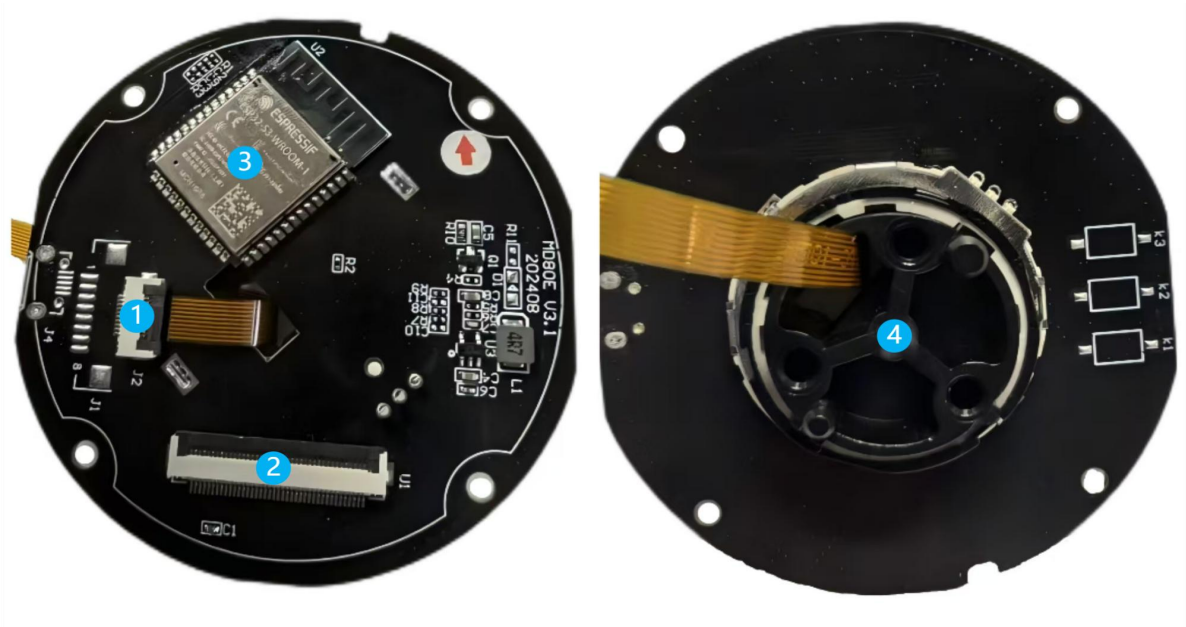
1.2 Appearance picture



2. Product information

2.1 Hardware Description

Mainboard:



① **USB power supply and burning interface**

Pin NO.	Symbol	Description	Voltage Range	Remarks
1	VCC	Power 5V	5V	
2	ADC	GPIO3, ADC IO	0-3.3V	Not Used
3	GND	Grounds	0V	
4	NC	NC	-	
5	NC	NC	-	
6	RX	UART Receive	0-3.3V	
7	TX	UART Transmit	0-3.3V	
8	RST	Reset signal, do not connect if not in use	0-3.3V	
9	D+	USB D+	3.3V	
10	D-	USB D-	3.3V	

The connector specifications is 10PIN 0.5mm pitch

② **Display Interface:**

Pin No.	Symbol	I/O	Description
1	LEDK	P	Power supply for backlight cathode
2	LEDA	P	Power supply for backlight anode
3	GND	P	Power Ground
4	VDD	P	Power supply for analog circuits
5-12	R0-R7	I	Red data input.(R0-LSB;R7-MSB)
13-20	G0-G7	I	Green data input.(G0-LSB;G7-MSB)
21-28	B0-B7	I	Blue data input.(B0-LSB;B7-MSB)
29	GND	P	Power Ground
30	CLK	I	Dot clock signal for RGB interface operation
31	RST	I	The signal will reset the LCM, Signal is active low.
32	HSYNC	I	Horizontal sync signal, Negative polarity
33	VSYNC	I	Horizontal sync signal, Negative polarity
34	DEN	I	Data input enable. Display access is enabled when DE is "H"
35	NC	-	No connected
36	GND	P	Power Ground
37	SPI_SDA	I/O	Data select pin for SPI interface
38	SPI_SCK	I	Clock select pin for SPI interface
39	SPI_CS	I	Chip select pin for SPI interface
40	GND	P	Power Ground

I：Input；O：Output；P：Power

③ **Main Control Chip: ESP32S3-MCN16R8**

Dual-core processor, up to 240MHz operating frequency

④ **Encoder and button:The combination implements the control of the screen interface**

Encoder:

Encoder model: EC35

Operating length: 15mm

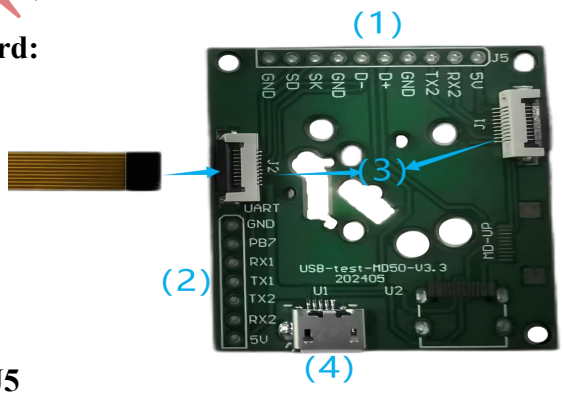
positioning torque: 12±5mN • m

Positioning number: 30

Button:

Button model: 6x6 silent switch

USB adapter board:



(1) Reserve IO: J5

Pin Name	Symbol	Description	Voltage Range	Remarks
5V	VCC	Power 5V	5V	
RX2	NC	NC	-	
TX2	NC	NC	-	
GND	NC	NC	-	
D+	USB D+	USB D+	3.3V	
D-	USB D-	USB D-	3.3V	
GND	GND	GND	-	
SK	NC	NC	-	
SD	NC	NC	-	
GND	GND	GND	0V	

(2) Reserve Interface: UART

Pin Name	Symbol	Description	Voltage Range	Remarks
GND	GND	Power 5V	-	
PB7	ADC	GPIO3, ADC IO	-	Not Used
RX1	RX	UART Receive	-	
TX1	TX	UART Transmit	-	
TX2	NC	NC	-	
RX2	NC	NC	-	
5V	VCC	Power 5V	5V	

(3) 10PIN-FPC J2: reference 2.1 Hardware Description:Mainboard/USB power supply and burning interface

(4) USB: Used for powering and burning code

2.2 Display Information

Item	Specification	Unit	Remark
Pixel Driving element	IPS TFT	-	-
Screen Size	2.1	Inch	Diagonal
Resolution	480(W)*3(RGB)*480(H)	Dots	-
Interface	3Wire SPI + RGB 24bits	-	40pin
Module Power Consumption	0.405	Watt	Typ.
Active Area	53.28(W)*53.28(H)	mm	-
Pixel Pitch(W*H)	111(W)*111(H)	um	-
Module Size(W*H*D)	56.18(W)*59.71(H)*2.22(D)	mm	-
Luminance	450	cd/m2	Typ.
Viewing Direction	All	O'clock	-
Display Color	16.7M	Colors	24Bits

2.3 Voltage & Current

Item	Conditions	Min	Typ	Max	Unit
Power Voltage	DC	4. 0	5.0	5.5	V
Operation Current	VCC= +5V, Maximum backlight current	-	320	-	mA
	VCC= +5V,backlight off	-	100	-	mA
Recommended power supply:5V 1A DC					

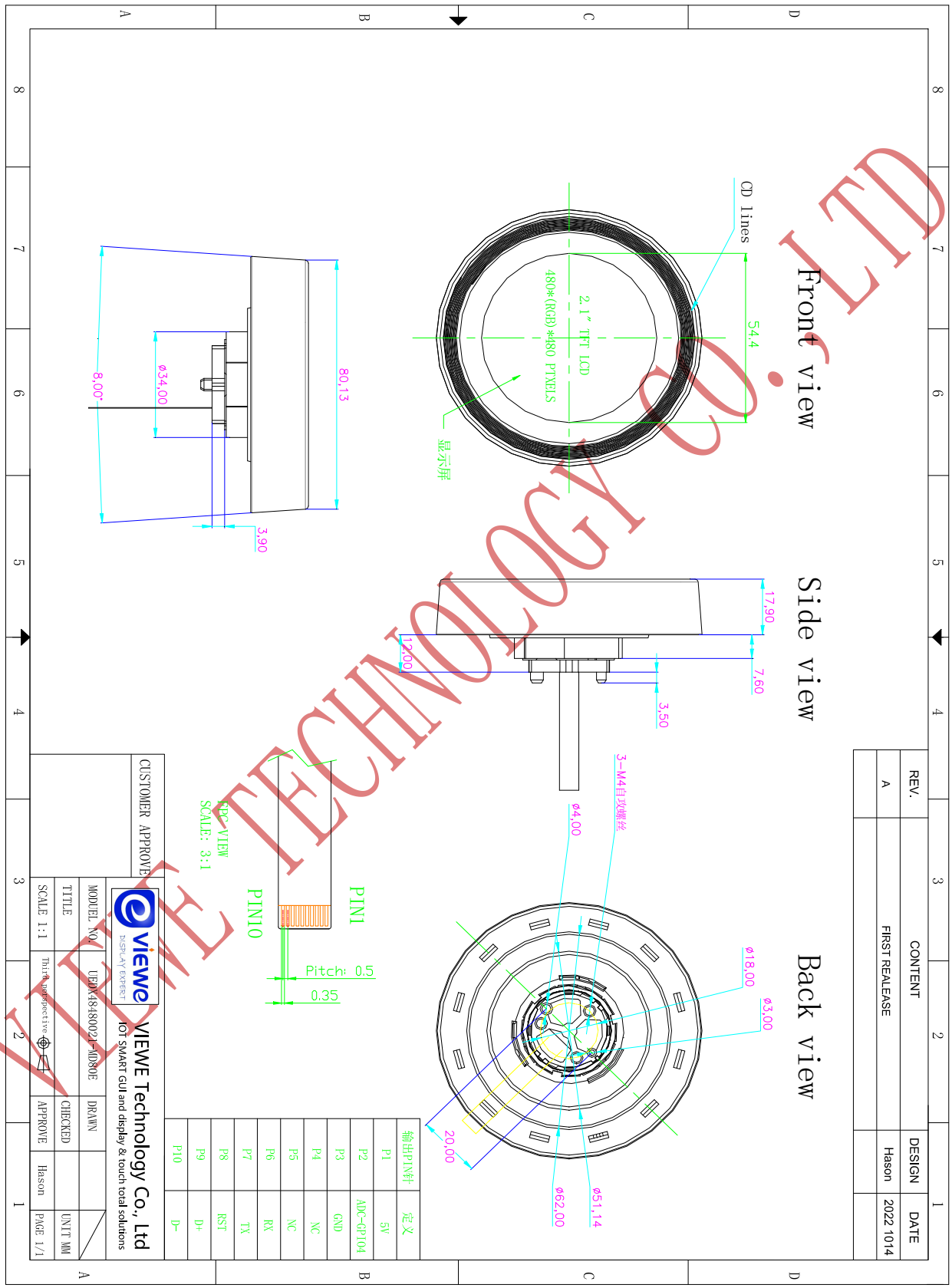
2.4 Reliability Test

Item	Conditions	Min	Typ	Max	Unit
Working Temperature	60%RH at 5V voltage	-20	25	70	C
Storage Temperature	---	-30	25	80	C
Working Humidity	25°C	10%	60%	90%	RH
ESD	---	Contact: ±4KV Air: ±8KV			KV

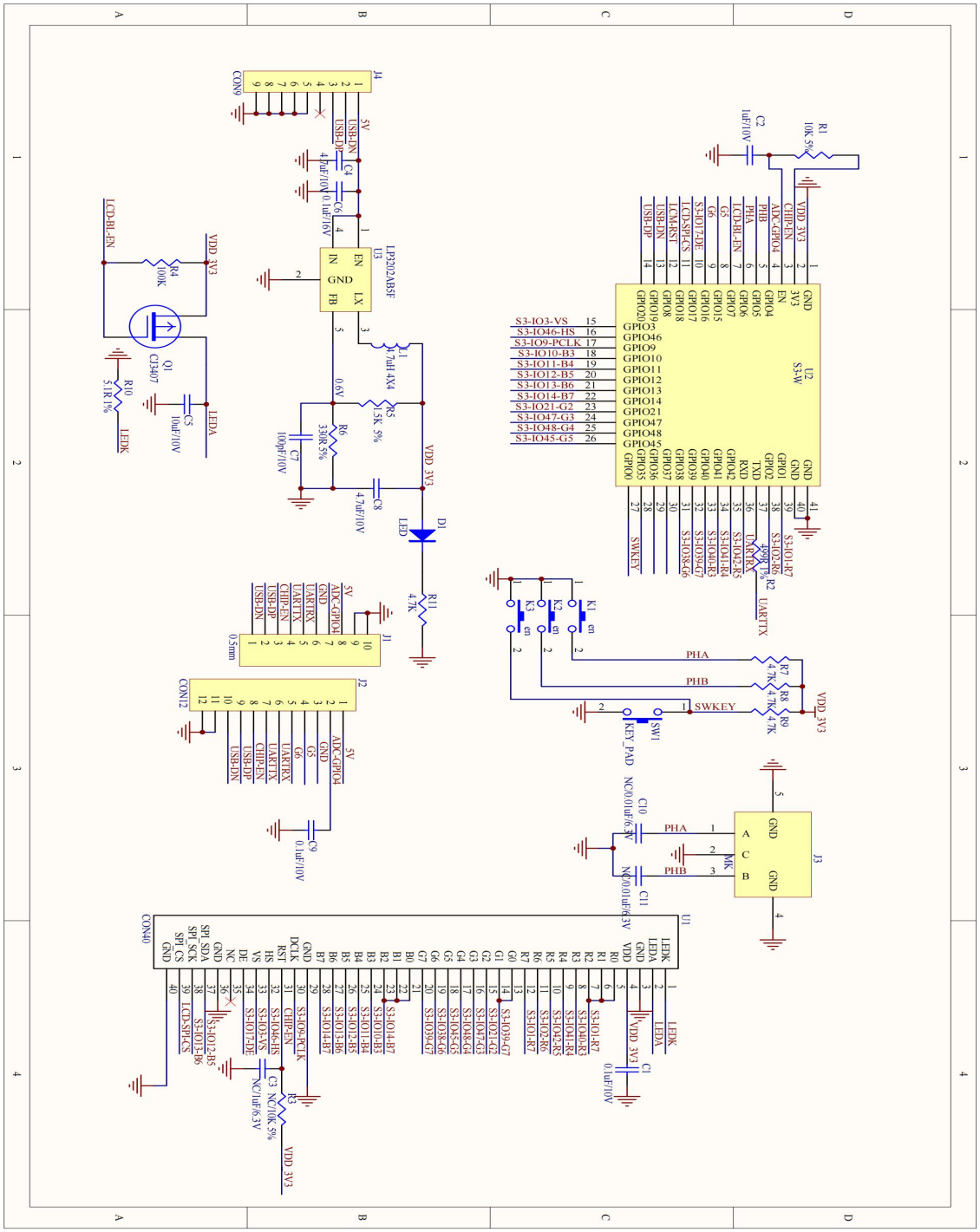
2.5 Related software

Software name	Version	Software associated configuration	Development environment configuration link
Arduino IDE	2.0.17 (esp32)	1. Board: ESP32S3 Dev Module 2. CPU Frequency: 240MHz (WiFi) 3. Flash Frequency: NO 4. Flash Mode: QIO 80MHz 5. Flash Size: 16MB (128Mb) 6. Partition Scheme: Default 4MB with spiffs (1.2MB APP/1.5MB SPIFFS) 7. PSRAM: OPI PSRAM 8. Programmer: Esptool	ESP32-Arduino config (github.com)
ESP-IDF	5.1.1 5.2.2	Once configured, no configuration is required （If you have any problem with the configuration, please contact us, we will help you）	ESP-IDF config (github.com)

3. MECHANICAL DRAWING



4. Schematic



5. Related downloads

5.1 Arduino relevant information

ESP32-Arduino/examples/UEDX48480021-MD80E-Arduino-SDK at main • VIEWESMART/ESP32-Arduino (github.com)

5.2 Libraries required for Arduino

ESP32-Arduino/examples/2.1inch/libraries at main • VIEWESMART/ESP32-Arduino (github.com)

5.3 IDF relevant information

ESP32-IDF/examples/UEDX48480021-MD80E-SDK at main • VIEWESMART/ESP32-IDF (github.com)