SMART DISPLAY MODULE SPECIFICATION

2.1 Inch Smart Knob Display with Touch and Wi-Fi /BLE	
Model:	UEDX48480021-MD80ET
Version:	V1.1
Date:	2025-01-07

Customer Confirmation 客户确认

Approved by	Notes

REVISION HISTORY

Revision	Date	Contents of Revision Change	Remark
V1.0	20241202	Preliminary release	
V1.1	20250107	Add GitHub link	

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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: FreeRTOS
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 18bits
6) Driver IC： ST7701S
7) Touch IC：CST826
8) Brightness: 300 cd/m^2
9) Backlight Type：White LED
10) Display mode： Normally Black

Other

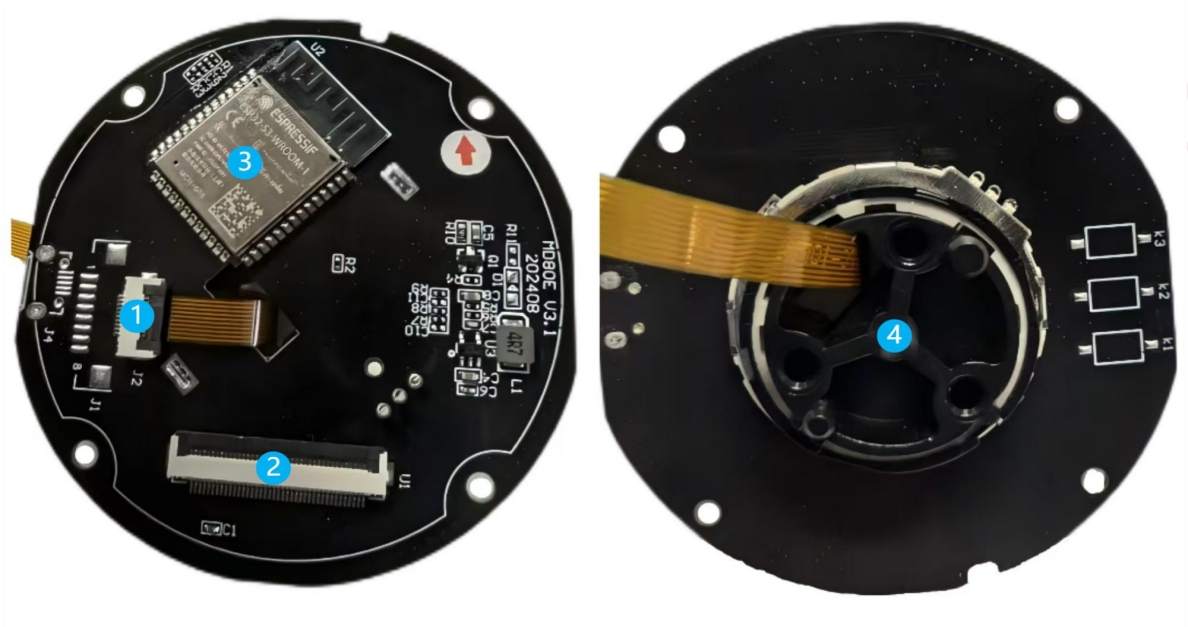
1) Operation Temperature：-20~70℃
2) Storage Temperature：-30~80℃

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	GPIO4, 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:

1	LED A	LED ANODE
2	LED K	LED CATHODE
3	LED K	LED CATHODE
4	GND	Ground
5	VCI	Power supply
6	RESET	Reset Signal ,Active Low
7	NC	NC
8	NC	NC
9	SDA	SPI Data signal
10	SCK	SPI Clock signal
11	CS	SPI Chip select signal
12	PCLK	RGB dot clock signal
13	DE	RGB data enable signal
14	VSYNC	RGB frame synchronizing signal
15	HSYNC	RGB line synchronizing signal
16~33	DB0~DB17	RGB data signal(DB0:BlUE LSB;DB5:BIUE MSB;DB6:GREEN LSB;DB11:GREEN,MSB;DB12:RED LSB;DB17:RED MSB)
34	GND	Ground
35	TP_INT	Touch Interrupt
36	TP_SDA	Touch IIC Data signal
37	TP_SCL	Touch IIC Clock signal
38	TP_RESET	Touch Reset Signal
39	TP_VCI	Touch Power supply
40	GND	Ground

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

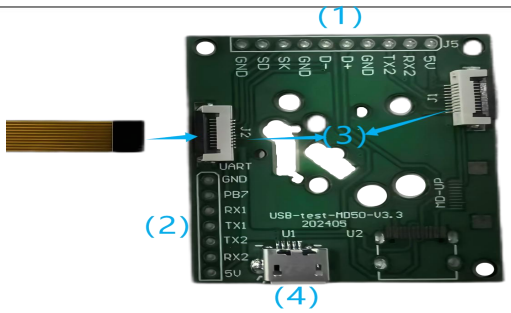
positioning torque: 12±5mN・m

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	GPIO4, 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 + 18RGB	-	40pin
Module Power Consumption	0.405	Watt	Typ.
Active Area	53.28(W)*53.28(H)	mm	-
Module Size(W*H*D)	71.27(W)*71.27(H)*3.43(D)	mm	-
Luminance	300	cd/m2	Typ.
Viewing Direction	All	O'clock	-
Display Color	262K	Colors	18Bits
Display Driver IC	ST7701S		
Touch Driver IC	CST826		

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					

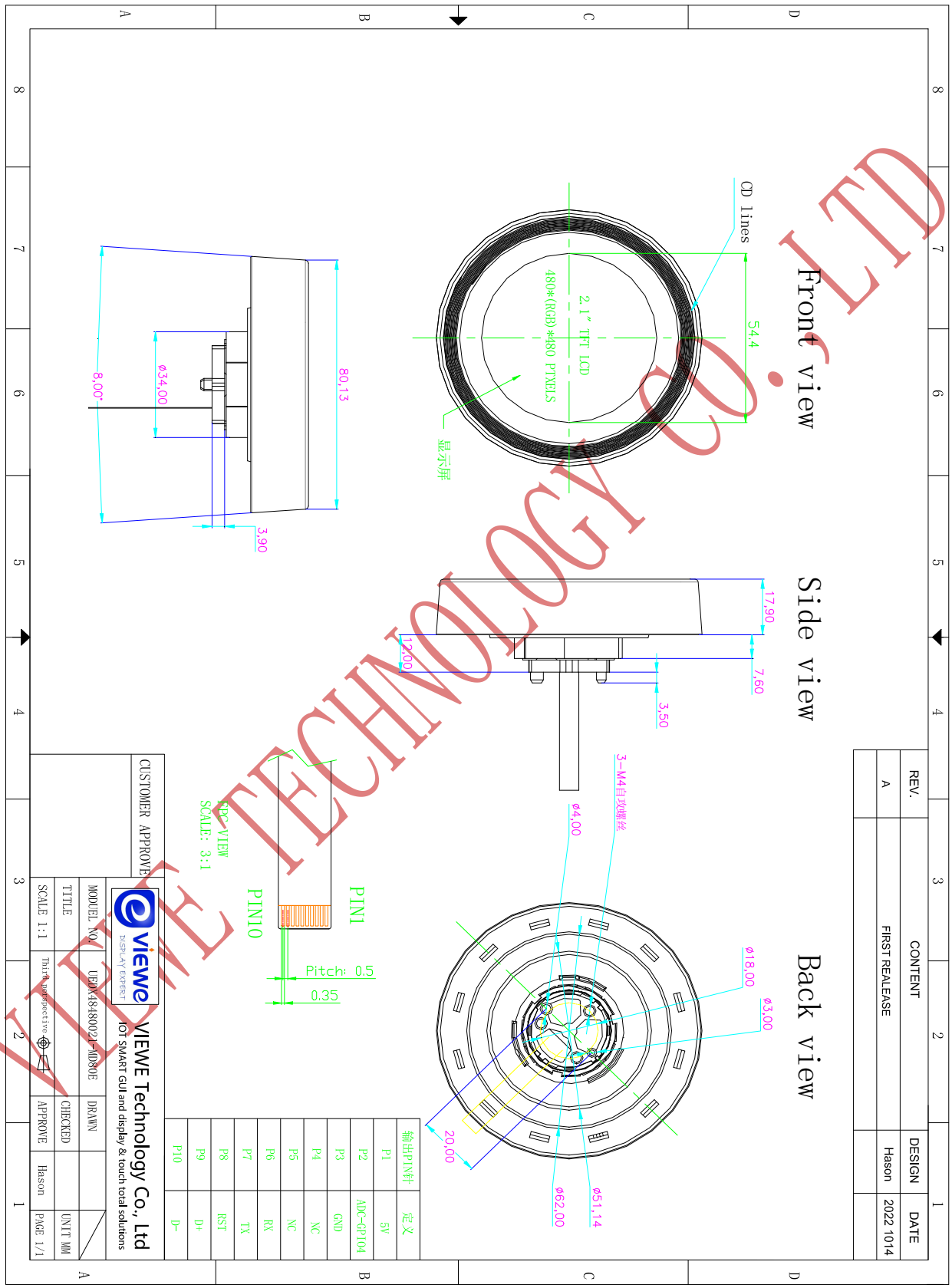
2.4 Reliability Test

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

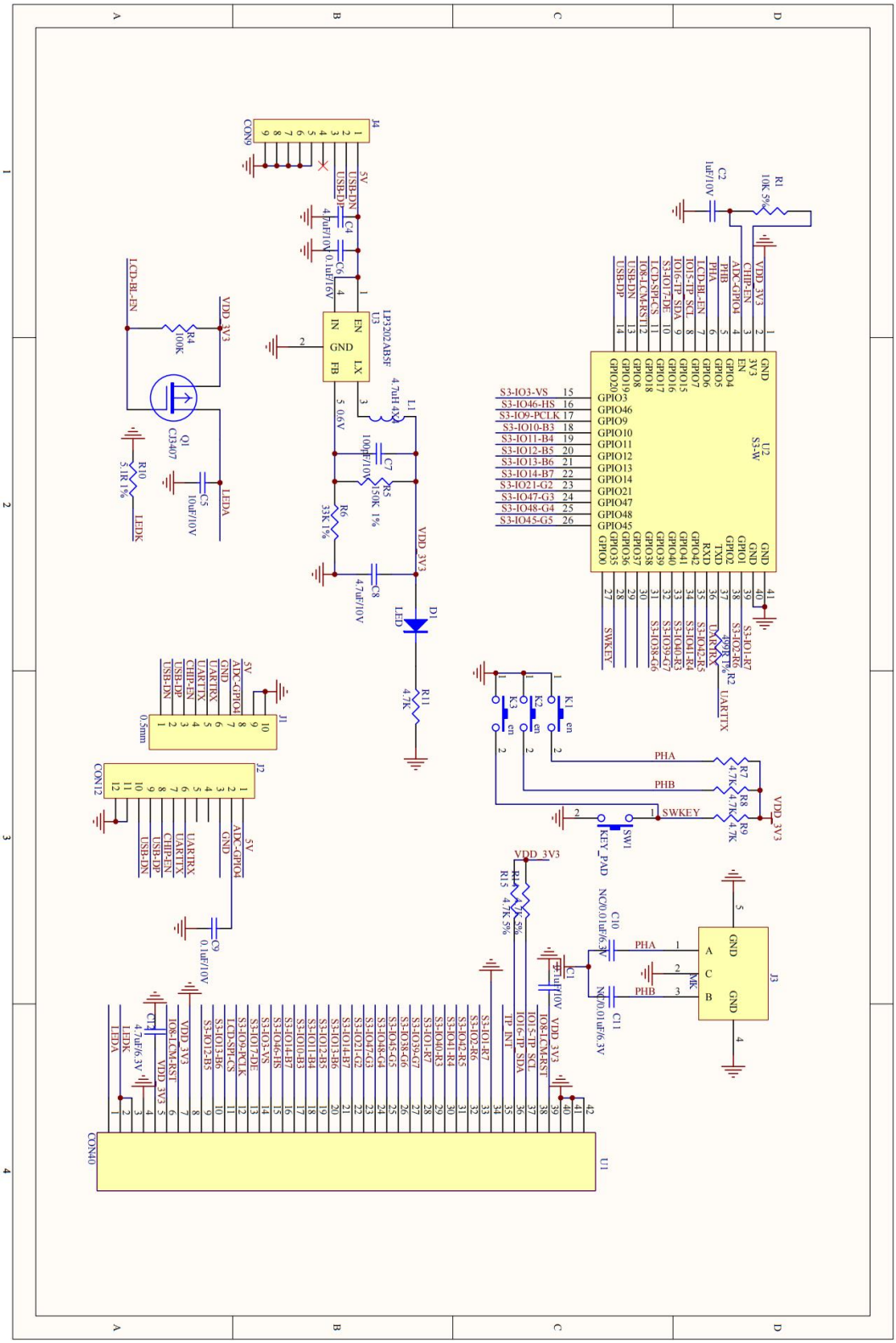
2.5 Related software

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 and IDF relevant information

https://github.com/VIEWESMART/UEDX48480021-MD80ESP32-2.1inch-Touch-Knob-Display

5.2 Libraries required for Arduino

https://github.com/VIEWESMART/UEDX48480021-MD80ESP32-2.1inch-Touch-Knob-Display/tree/main/Libraries