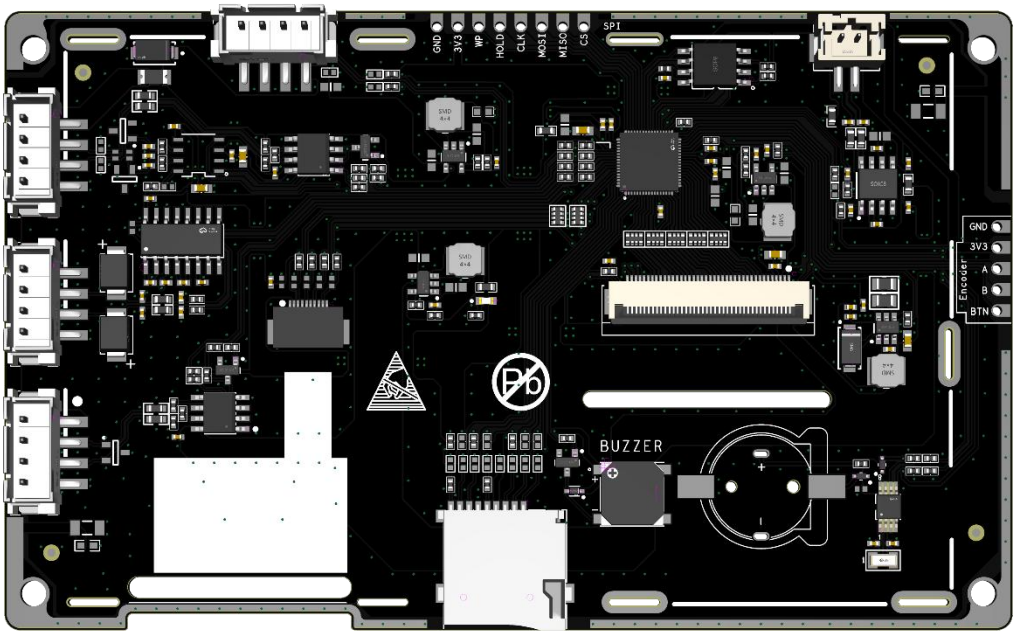
M103 Specification



document status	Project name	XC_PCBM3C_M103
【√】Draft	version	V2
【 】Official release	author	Darren
【 】Under revision	Audit	Jacey

signalhk.com/product_detail/SHKPID1HR9ZT48/XC_PCB9866-T201

revised record

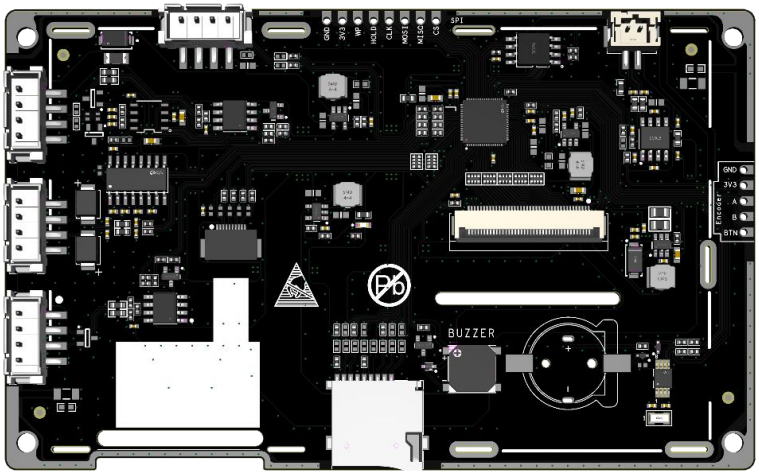
The following represents only the changes between this version and the previous one
Revision history shown in previous versions will not be retained in the following table

dates	revised record
2024/07/10	● PCB board name: XC_PCBM3C_M103（version V1） ● Software Version：m3c_XCM103_v1.0.0.img ● Matching screen：BDT0430WQVLIFNN006 SPEC（4.3 寸） ● Matching touch screen：4.3-inch capacitive/resistive screen
2024/07/15	Revised some of the parametric information and illustrations
2024/07/16	Revision of some text and unit errors
2024/07/26	Revised partial parameters
2024/08/20	Revised Board Parameters section information
2024/11/27	Add RTC real-time clock circuit function ● PCB board name: XC_PCBM3C_M103 (version V2) ● Software Version: m3c_XCM103_v2.0.0.img ● Matching screen: BDT0430WQVLIFNN006 SPEC (4.3") Matching touch screen: 4.3-inch capacitive/resistive screen

catalogs

1.0 Product Introduction

1.1 Product characteristics



XC_PCBM3C_M103 is based on the M3C design of an industrial-grade PCBA board (hereinafter referred to as M103), suitable for the need for low to medium performance, rich industrial interfaces and high reliability applications, such as industrial automation control and smart home equipment, very cost-effective.

- M103 has rich IO resources, the chip has up to 60 GPIOs, to solve the problem of user IO resource constraints.
- The M103 supports a variety of industrial interfaces (CAN, RS232, RS485, SPI, I2C, etc.) for industrial applications.
- The M103 is powered by a single-core E907 with a frequency of up to 400MHz, which is sufficient for low to medium performance applications.
- The M103 supports the SPI bus encryption module and data verification engine for security functions.
- The M103 supports PNG/JPEG decoding engine, suitable for image processing needs.
- The M103 supports 2D graphics accelerated processing with a maximum resolution support of 1024x768@60fps.
- The M103 supports various touch modes, such as resistive touch, capacitive touch and external knob method.
- M103 supports serial port or TF card upgrading and burning, and users can flexibly use LVGL for secondary development of UI.

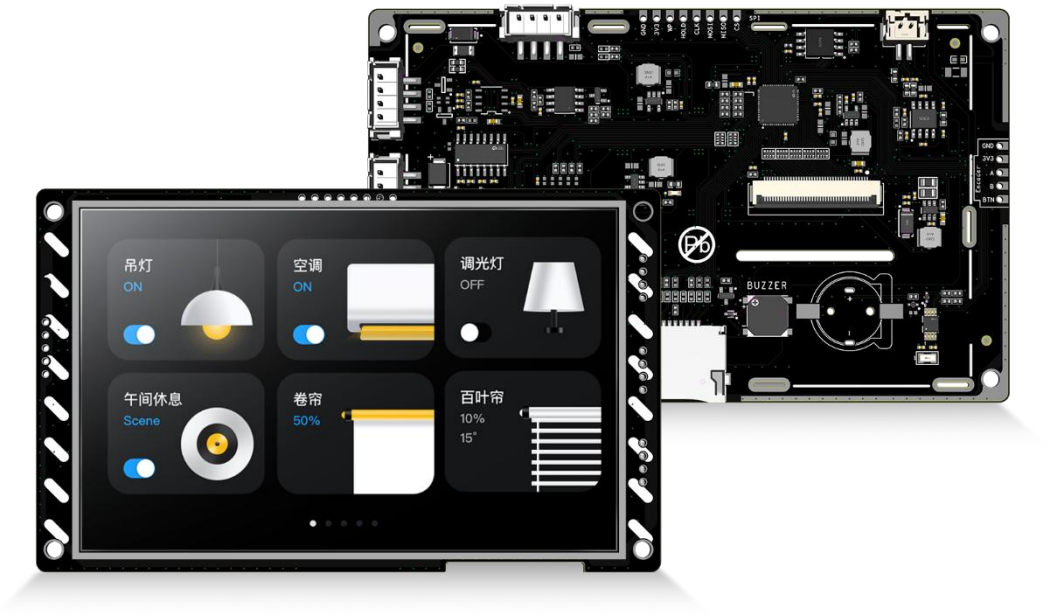
1.2 **Product parameters**

1.2.1 Circuit board parameters

module	Project name	Parameters and information
CPU	CPU core	E907
	typical frequency	400MHz@1.1V
	bit width	32-bit (computing)
	instruction set	RISC-V
	Icache	32KB
	Dcache	16KB
	floating point unit	Single precision, double precision, DSP instruction set
stockpile	on-chip memory	BROM:32KB
		SRAM:32KB
		PSRAM: 4MB (up to 200MHz DDR)
	on-board storage	Nor FLASH: 16MB (128Mbit)
demonstrate	LCD	Supports 24-bit parallel RGB, up to 1024x768@60fps.
		Support SRGB/I8080/QSPI screen interface (M103 board connected to RGB parallel port by default)
		Spread spectrum support (EMC radiation suppression)
	DE Display Engine	Support one layer, 1024*768@60fps
	GE Imaging Engine	Supports 2D image acceleration, rotation mirroring and other processing
	VE Video Codec	Supports JPEG and PNG decoders up to 720P@60fps
	H.264 decoder	unsupported
touching	CTP	Capacitive touch screen support
	RTP	Supports 4-wire resistive touch screen
	knobs	Supports the use of expansion interfaces, external encoder knob modules
communication interface	RS232	be in favor of
	RS485	be in favor of
	CAN	be in favor of
	expansion	Support IIC,SPI,UART

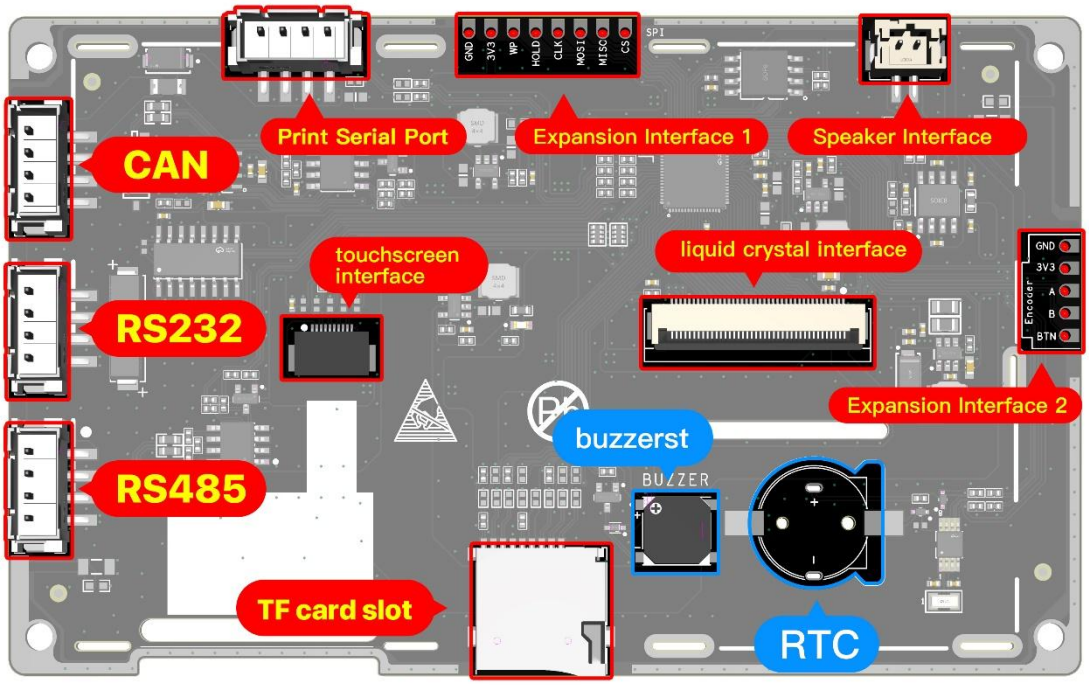
	interface	
activation method	startup sequence	SD Card>Nor Flash>Nand Flash>eMMC
	TF Card Brush	be in favor of
	UART Swipe	be in favor of
sound frequency	buzzers	be in favor of
	speakers	be in favor of
PCB Physical Parameters	plate size	122mm*75mm*1.6mm
	PCB Layers	2-ply sheet (FR-4 sheet)
	screw hole	Four metallized perforations, perforation diameter 3MM
electric power source	5V DC input	RS485, RS232 and CAN (4PIN) can be used as power inputs.

1.2.2 Screen parameters



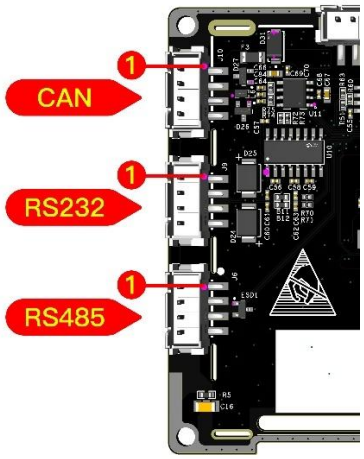
Project name	catalogs	unit	note
LCD Type	TFT，IPS	-	
Display Color	16.7M	Color	
Viewing direction (grayscale inversion)	ALL	O`Clock	
operating temperature	-20~+70	℃	
Storage temperature	-30~+80	℃	
Module Size	105.5 x 67.2 x 2.9	MM	
Activity area (W x H)	95.04 x 53.86	MM	With·Tape
pixel	480 x 272	Dots	
controllers	ILI6485 or equivalent	-	
backlighting	8S1P-LEDs（white）	Pcs	
connector	24bit-RGB	-	-

2.0 User Interface Profile



name	descriptive
CAN	CAN interface @5Mbit/s,VCC=5V
RS232	Asynchronous serial port, full duplex, VCC=5V
RS485	Asynchronous serial port, half duplex, strong anti-interference, non-isolated, default Baud=115200, VCC=5V
Print Serial Port	Debugging the Debug port. When the RS485 interface is not in use, this interface can be used as a TTL level UART communication interface.
touchscreen interface	This interface is capacitive touch interface
Speaker Interface	5W mono digital audio amplifier interface
buzzers	Electromagnetic buzzer (2.7KHz)
liquid crystal interface	RGB parallel port, LCD interface includes 4-wire resistive screen signals
TF card slot	TF card slot
Expansion Interface 1	Support 4-wire SPI, UART function
Expansion Interface 2	Supports IIC and UART functions

Communication + power interface definition (J6,J9,J10):



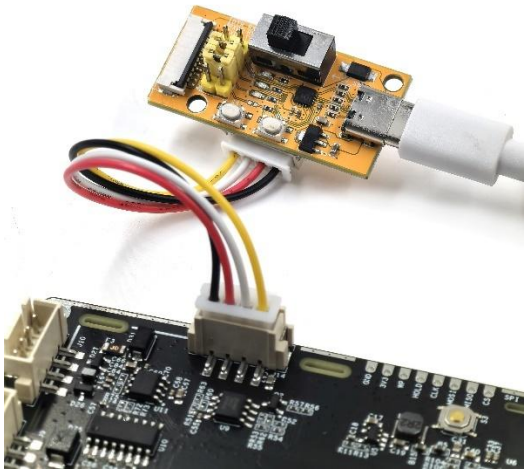
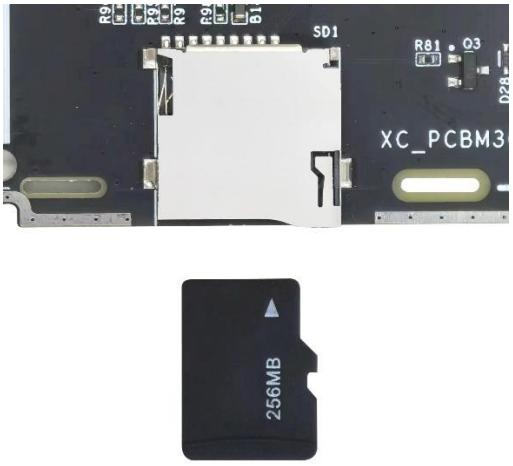
PIN number	CAN connector	RS232 connector	RS485 connector
1	5V	5V	5V
2	CANL	TX(DO)	A
3	CANH	RX(DI)	B
4	GND	GND	GND

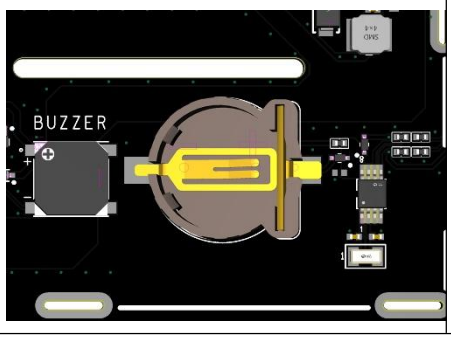
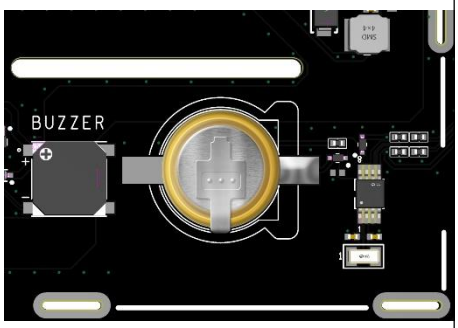
DO:Data Out DI:Data In

Remarks:

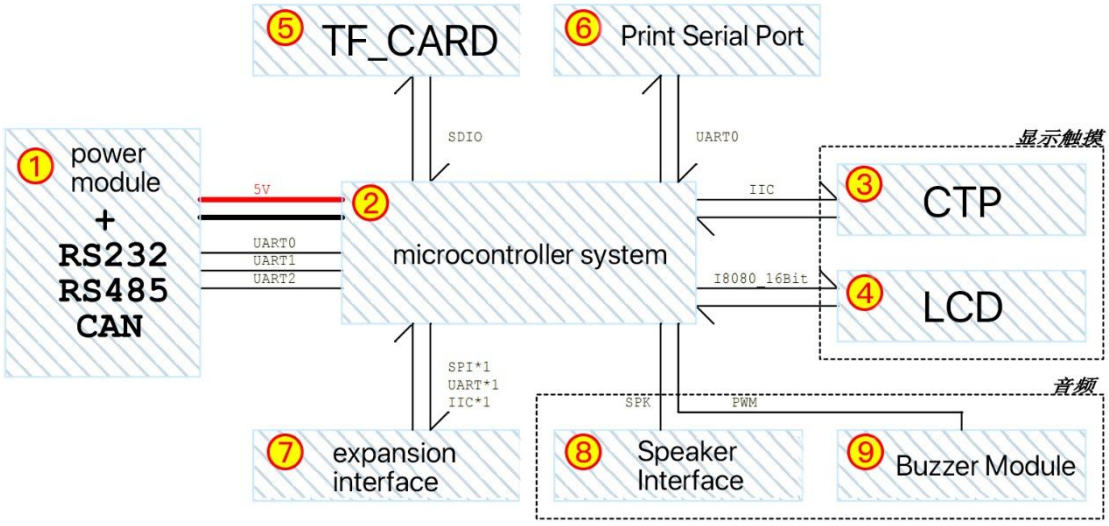
1. All three holders can be powered as 5V input supplies.
2. The 5V of the three holders is on the same network, as is the GND, and it is sufficient to have one holder as a power supply connector.

Burning Interface:

① Serial Tools Burning	② TF card burning
	
Use UART to USB tool to download the program online from your computer	Put the firmware on the TF card and unplug the card to upgrade it

functionality	RTC – button cell	RTC – supercapacitor
RTC real time clock power supply		
note	The board is reserved for external RTC circuits, and the second power supply has two selective posting schemes that customers can choose as needed. Attention: 1. Super capacitor (farad capacitor) rechargeable program, suitable for frequent power down and up program, super capacitor a power up and charge, to the board after power down, can maintain the counting function for one or two weeks. 2. Coin cell battery solution that lasts two to three years of operation and needs to be replaced when the battery runs out. The above power to maintain the operation of the time is only for reference, according to different environments, there will be time differences	

3.0 functional diagram

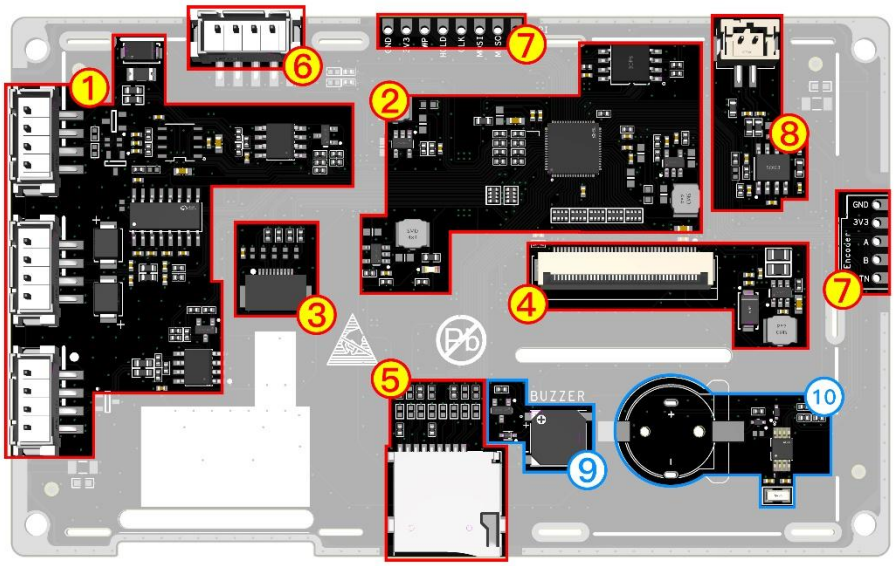


Above is the functional block diagram of the board, in addition to the main control there are four major functional modules, respectively, the LCD module, touch module, audio module and serial communication module

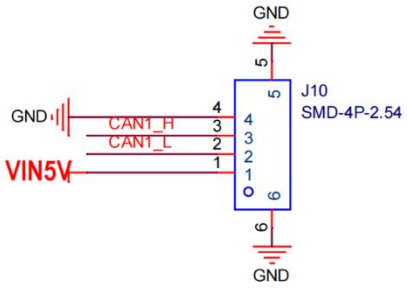
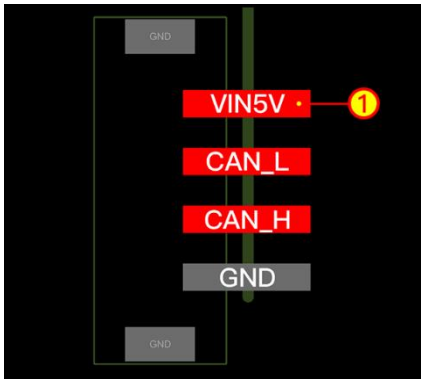
- LCD module: RGB parallel port, TFT_IPS
- Touch Module: Capacitive Screen Touch/Resistive Screen Touch
- Audio module: speaker/buzzer
- Communication serial module: RS232/RS485/CAN

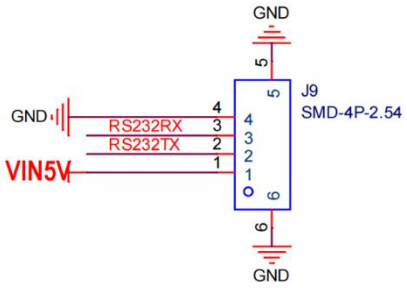
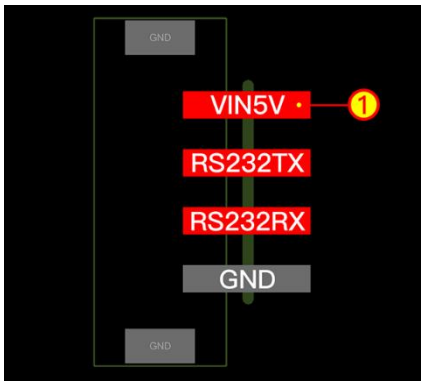
In addition, the two circuits, TF card and print serial port, are used by engineers for debugging, while the expansion interface is to help meet other expansion needs of customers.

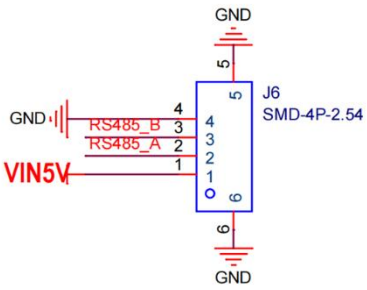
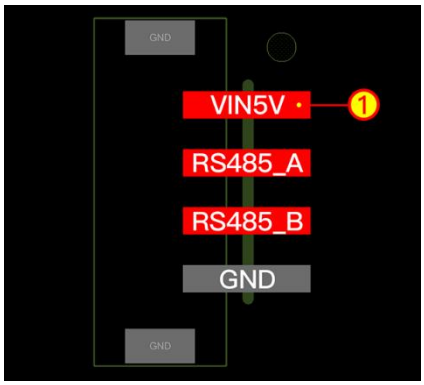
Number	Module	Description
1	power module + Communication Module	To provide 5V main power to the board, the power is filtered and anti-surge circuitry to reach the on-board DCDC to generate 3.3V and 1.8V power. Also provides RS485/RS232/CAN communication function.
2	microcontroller system	M3C chip built-in crystal and built-in LDO, so that the main control only need a small amount of resistance and capacitance with FLASH can be set up a small microcontroller system. FLASH can be replaced with Nor/Nand Flash of different capacities according to customer requirements. (Default 128Mbit nor flash posted)
3	CTP	Capacitive touch interface, reserved
4	LCD	LCD interface, including four-wire resistive screen interface
5	TF_CARD	Plug-in card upgrade burn-in program
6	Print Serial Port	Debugging Serial Ports
7	expansion interface	Support IIC,SPI,UART
8	Speaker Interface	Support 3W/3.8W/5W speakers
9	Buzzer Module	Electromagnetic Buzzer Module
10	RTC real time clock	RTC circuit, the second power supply has two selective paste program, the customer can choose as desired

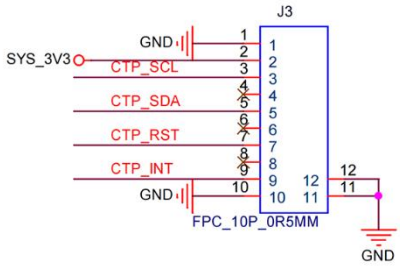
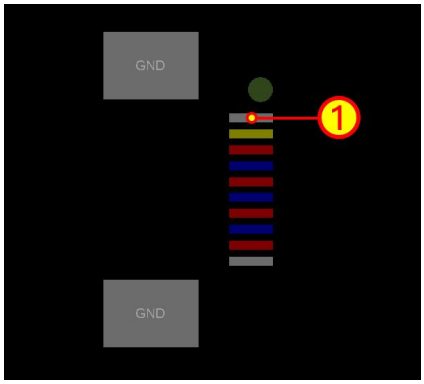


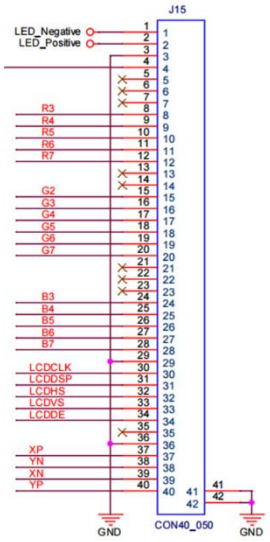
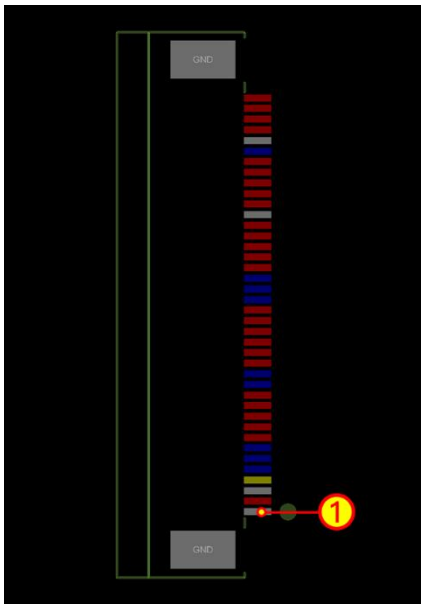
4.0 Interface Schematic & PCB Comparison

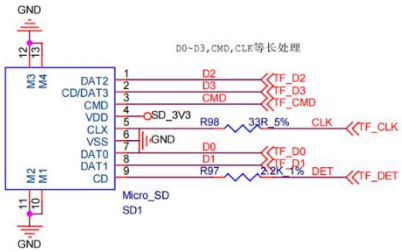
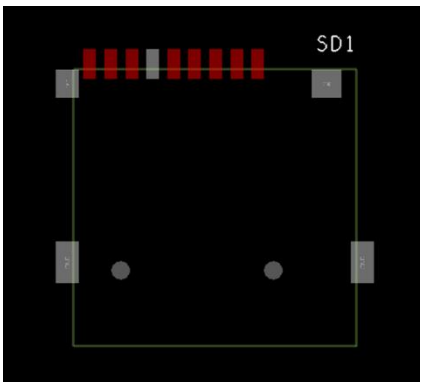
connector	schematic	PCB
CAN		
note	5V DC power supply + CAN communication, 4PIN_2.54MM	

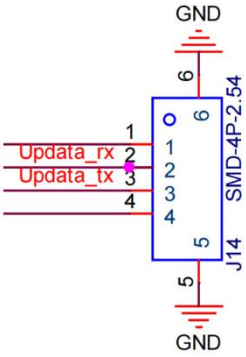
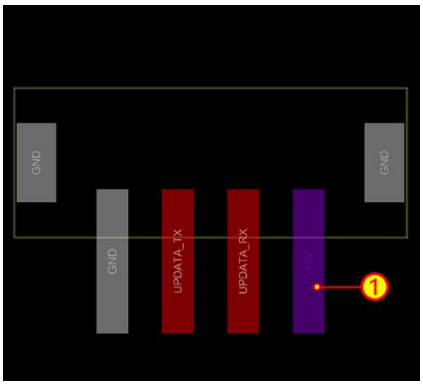
connector	schematic	PCB
RS232		
note	5V DC power supply + RS232 communication, 4PIN_2.54MM	

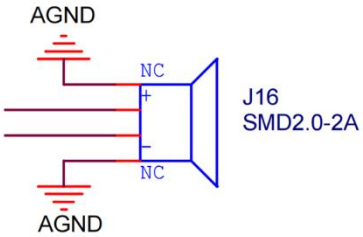
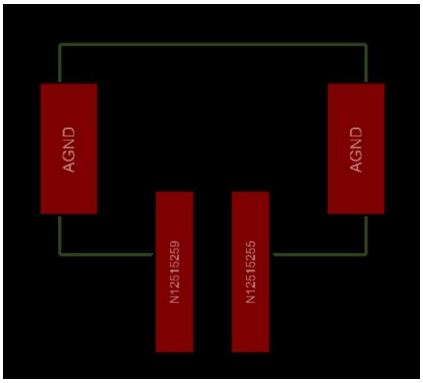
connector	schematic	PCB
RS485		
note	5V DC power supply + RS485 communication, non-isolated, 4PIN_2.54MM	

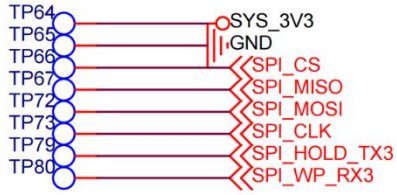
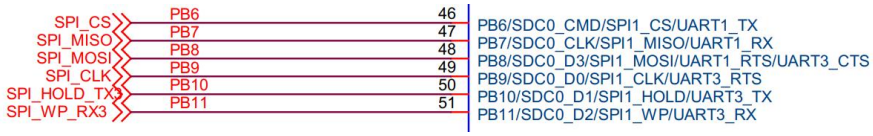
connector	schematic	PCB
CTP		
note	Capacitive touch screen interface, support double-sided contact, 10PIN_0.5MM	

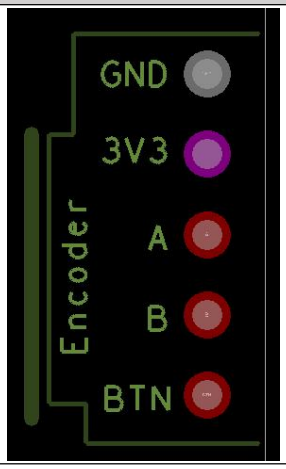
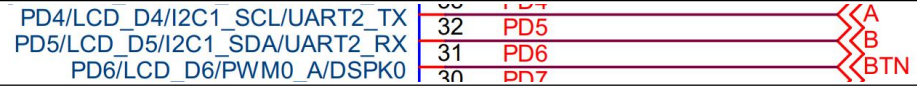
connector	schematic	PCB
LCD		
note	LCD screen interface, support double-sided contact, 40PIN_0.5MM	

connector	schematic	PCB
TF CARD		
note	Standard TF card slot	

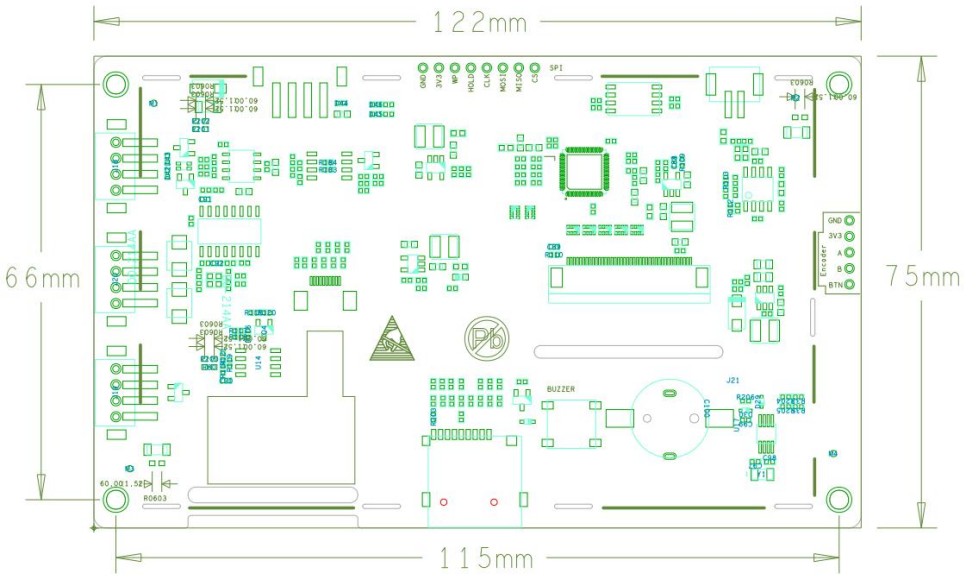
connector	schematic	PCB
Print Serial Port		
note	Debug Serial Port Holder, 4PIN_2.54MM	

connector	schematic	PCB
speakers		
note	Speaker Connector (Horn), 2PIN_2MM	

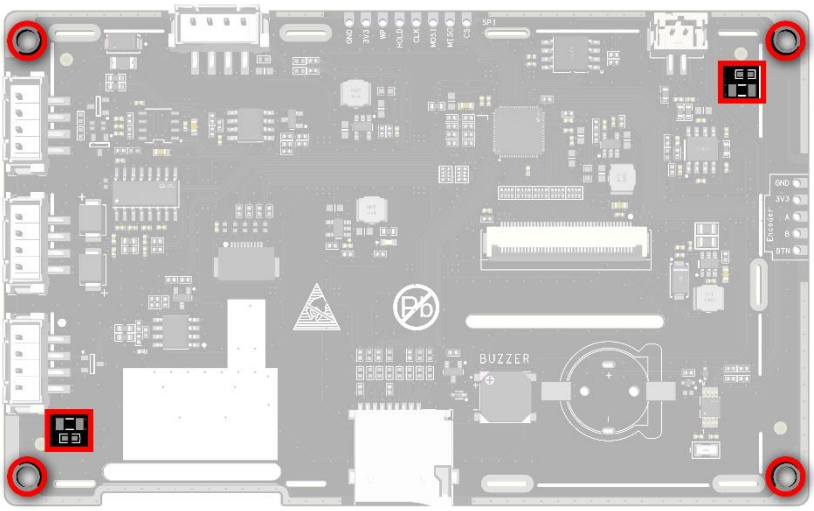
connector	schematic	PCB
Expanded SPI Interface		
note	Expansion connector with 2.54mm hole spacing	
configure		

connector	schematic	PCB
Encoder knob interface		
note	Expansion interface, hole spacing 2.54MM, can be used to hang a knob encoder plate	
configure		

5.0 PCBA Structure Diagram

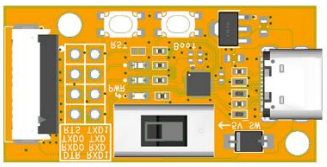
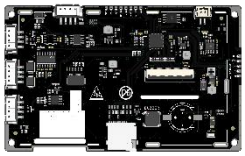


- M103 has four metallized perforations on the board (perforation diameter 3MM), which are holes that can be screwed to the metal casing of the device or connected to the earth, and a 2KV high-voltage withstand capacitor + 1MΩ resistor inside the board, which helps to slowly discharge the charge accumulated from the daily operation of the device.
- If there is no metal frame grounding conditions, directly as a positioning hole can be used, play a role in fixing the board.

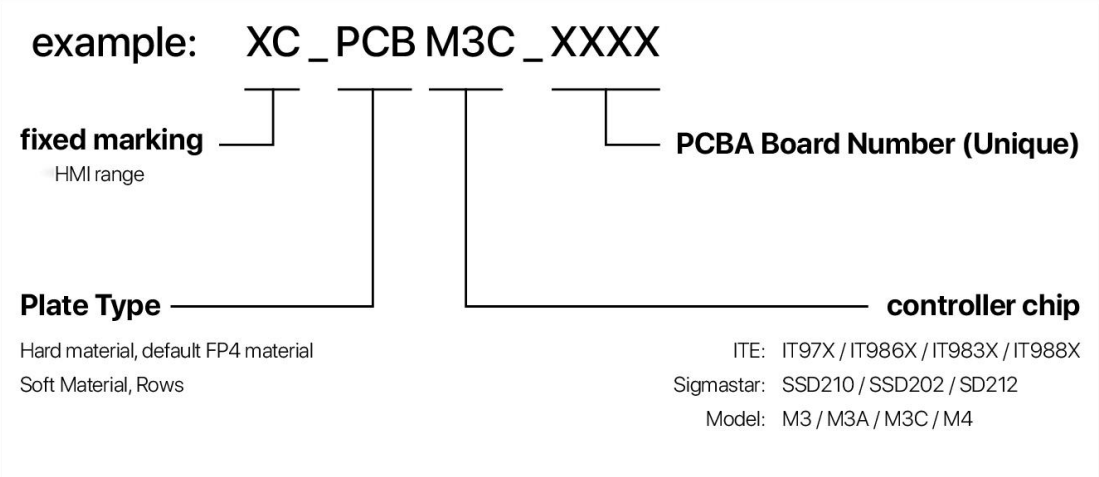


(示例图)

6.0 Supporting Tools

Name	norm	note	photograph
tool board	TL01 Toollet (Serial to USB tool))	Power Supply, UART Burn, Debug Print Serial Port	
data cable	1 meter	USB to Type-C	
PCB	XC_PCBM3C_M103	motherboard	
monitor	BDT0430WQVLIFNN006 SPEC	4.3-inch LCD screen	
USB flash drive	reader	SD card support TF card.	
TF card	TF card	256MB	

7.0 Ordering Information



markings	typology	number	descriptive
XC	PCB9866	T201	It's the board that goes with the 4.3-inch screen, and he's based on the IT9866 design.
XC	PCB9866	T202	It's the board that goes with the 5-inch screen, and he's based on the IT9866 design.
XC	PCB9866	T203	It's the board that goes with the 5.7-inch screen, and he's based on the IT9866 design.
XC	PCB9866	T204	It's the board that goes with the 7-inch screen, and he's based on the IT9866 design.
XC	PCB9866	T205	It's the board that goes with the 8-inch screen, and he's based on the IT9866 design.
XC	PCB9866	T206	It's the board that goes with the 10.1-inch screen, and he's based on the IT9866 design.
XC	PCB9836	T301	It's the board that goes with the 7-inch screen, and he's based on the IT9866 design.
XC	PCBM3C	M101	It's the board that goes with the 5-inch screen, and he's based on the M3C design.
XC	PCBM3C	M102	It's the board that goes with the 2.4-inch screen, and he's based on the M3C design.
XC	PCBM3C	M103	It's the board that goes with the 4.3-inch screen, and he's based on the M3C design.
...	...	...	...