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Product Datasheet

Medical Grade ET013COF2424-DC Datasheet V1.0

ISO9001:2015 Quality System Certification

Customer			
Keyword	S series, Smart medical grade, 1.3 inch, 240*240, Low power, configurable, Cortex-M3 core, TTL, LUA scripting		
Model	ET013COF2424-DC		
Signature of Customer		Signature of Engineer	
Date		Date	

Version Record

Version	Date	Reason for modify	Page	Written by	Reviewed by
V1.0	2024/05/18	File creation	all		

Catalog

1. Hardware Introduction

This section mainly introduces some appearance reference diagrams, hardware configuration diagrams and tools required for debugging of the product.

1.1 Product appearance

The product is designed with COF ultra-thin structure, and the following is a reference drawing of the appearance of different models of this size, as shown in Figure 1-1.

Note: There is no modification of key structural processes or major adjustments in layout, only changes and iterations in product processes or reliability, and the company will not initiate external changes, and the specific physical objects received shall prevail.

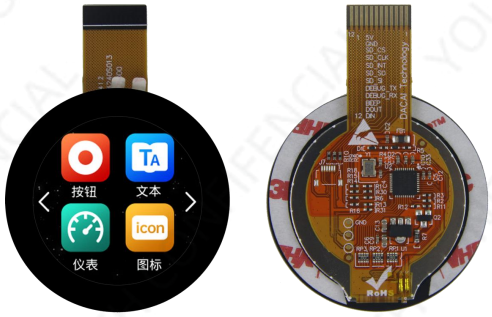


Figure 1-1 1.3 inch non-touch reference diagram

1.2 Hardware configuration

The following is a reference diagram of the hardware configuration of the product of this size, as shown in Figure 1-2.

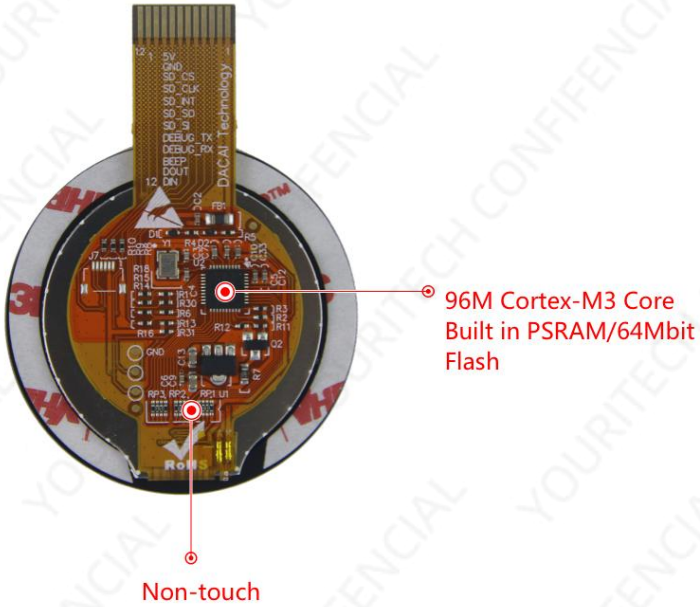


Figure 1-2 Hardware configuration diagram

1.3 Debugging tool

The following is a reference diagram of the debugging tool of the product, as shown in Figure 1-3.

Figure 1-3 Debugging tool diagram

◆ Development of commissioning accessories (optional)	
Name	**Accessory model**
Serial debug board	S series COF debug board
SD card (with card reader)	Kingston 8G
Type-C cable	TYPE-C data cable, 5V 1A 1m long, white

Note:

1. Type-C cables can also be prepared by customers.
2. The test board leads to the SD card holder and buzzer for customers to download and test.

2. Product Specifications

◆ Product parameters	
Model description	ET013COF2424-DC(TTL, non touch)
Product Series	S series, Smart medical grade
Core processor	Cortex-M3 core
Operating system	No operating system, power on and running
Protocol type	The default YOURITECH configuration instruction set, the host computer can be configured to run MODBUS RTU, XGUS protocol
Scripting language	Version 5.3 LUA script, the screen can run user-written logic, protocol and algorithm functions
Size	1.3 inch
Resolution	240*240
Installation orientation	It supports 0°, 90°, 180° and 270° rotation mounted displays
Storage space	64Mbit (Built-in chip)
Font	Built-in vector font, edge anti-aliasing, support any size ASCII, GBK, GB2312, UNICODE (global language) font library, can also customize any computer font display
Image Storage	It supports JPEG and PNG (transflective/fully transparent) compression, and supports image storage of any size. Accumulate and store about 90 full-screen images (calculated by size of 60KB/image, BMP format is not recommended). Depending on the image compression ratio, this value will fluctuate up and down
Color	65K color，16-bit RGB
Voltage	5V(Minimum 4.5V start-up)
Power consumption	Darkest backlight：0.2W
	Brightest backlight：0.4W
Communication method	TTL
Communicate Baud-rate	1200～921600bps, typical baud rate：115200bps
Communication Connector Specifications	FPC1.0-12P
Image Local Download	SD card, serial port
Firmware Local/Remote Upgrade	Insert SD card to upgrade locally / support remote serial port of user motherboard to upgrade screen firmware
Picture Remote Upgrade	Support users to remotely use their motherboard serial port to upgrade screen-related picture projects, font libraries, configuration files, etc.
Screen Active Display Area (AA)	Length*width = 32.4mm*32.4mm
Product Size (L*W*H)	45.0mm*45.0mm*5.2mm
Supporting Host	VisualTFT®

◆ Reliability parameters	
Operating temperature	-20～+70℃
Storage temperature	-30～+80℃
ESD Test	No abnormal display：Contact：±2KV，Air：±4KV
EFT Test	IEC 61000-4-4 GB 4 (Voltage: ±4KV; Frequency: 5KHZ; TIME: 120S), no restart, no abnormal display, no abnormal touch, etc., the test function is normal
Radiation Test	EN55022 ClassB margin - 6dB

◆ Product core competitiveness	
Learning Cycle	30 minutes to familiarize yourself with the development environment, 3 days to complete the HMI design
Program Debugging	The host computer integrates a "TFT Simulate", which does not need to be connected to the hardware, and Keil IDE is directly bound to it for debugging
Startup Time	Run at power-on, no system load time
Configure Controls	It has a variety of configuration controls such as multi-language, button, text, drop-down menu, progress bar, slider, meter, animation, QR code, curve, historical curve, data record, circular progress bar, sprite slide control and so on
System Keyboard	Built-in virtual number, character keyboard, support Chinese and English input methods, customize keyboard
Data Logging	Supports exporting data logging control content to SD card
Layer Technology	The system has multiple built-in display layers for faster switching
Multi-Language Capabilities	Factory preset up to 15 languages of any country in the world, one-click switch of the required language, without the need for multiple sets of UI
Logical Operation Processing	The LUA script compiler is embedded in the host computer, and users can customize various complex logic relationships and protocols on the screen, meeting 99.9% of the product function requirements of customers
Remote Upgrade	Support remote serial port to upgrade screen firmware, project files, specified pictures, configuration files and font libraries
Life Cycle	Using traditional YOURITECH processors, non-stop goods for many years

◆ LCD	
Display Type	IPS LCD
Backlight Tube	LED
Brightness（cd/m²）	400
Backlight Life（h）	>20,000
Contrast Ratio	1100:1
Visual Angle （L/R/T/B）	85/85/85/85

◆ Customized Services	
Custom Fee	Sign a 1000PCS contract at one time, and some can be exempted from customization fees
Hardware Circuitry	Customizable PCB size, circuit thickness, add user circuit, military-grade

	temperature display, etc.
Software Customization	Customize special instructions or controls according to user needs to reduce user development difficulty
Art Services	Can provide picture art and product structure design services
Other	Customized on demand to meet all user needs

3. Installation Diagram

Note: The installation diagram is a public picture for reference only, not a physical reference diagram of the product.

Installation method 1：

COF系列安装方法1示意图
(COF SERIES INSTALLATION METHOD 1 SCHEMATIC DIAGRAM)

第一步：如上图所示，客户根据产品尺寸开好孔位
(STEP 1: AS SHOWN IN THE FIGURE, THE CUSTOMER OPENS THE HOLE POSITION ACCORDING TO THE PRODUCT INCH)

第二步：如上图所示，将触摸盖板后面四周3M胶保护膜撕掉，露出3M胶
(STEP 2: AS SHOWN IN THE FIGURE ABOVE, PEEL OFF THE 3M ADHESIVE PROTECTIVE FILM AROUND THE BACK OF THE TOUCH COVER PLATE TO EXPOSE 3M ADHESIVE)

第三步：如上图所示，压紧屏幕确保屏幕盖板的3M胶与机柜表面完全贴合
(STEP 3: AS SHOWN IN THE ABOVE SHOWS THAT THE SCREEN IS PRESSED FIRMLY TO ENSURE THAT THE 3M GLUE OF THE SCREEN COVER IS COMPLETELY ATTACHED TO THE SURFACE OF THE CABINET)

第四步：如上图所示，将客户主版安装于外壳上并拧紧螺丝固定,并插入排线
(STEP 4: AS SHOWN IN THE FIGURE ABOVE, INSTALL THE CUSTOMER MASTER ON THE HOUSING AND TIGHTEN THE SCREWS TO SECURE IT, AND INSERT THE CABLE)

第五步：安装完成
(STEP 5: INSTALLATION COMPLETE)

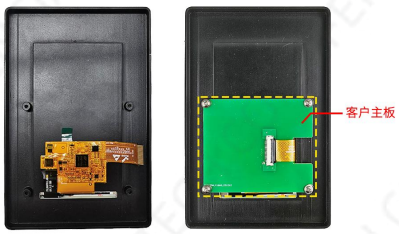
Installation method：

COF系列安装方法2示意图
(COF SERIES INSTALLATION METHOD 2 SCHEMATIC DIAGRAM)

第一步：如上图所示，客户根据产品尺寸开好孔位
(STEP 1: AS SHOWN IN THE FIGURE, THE CUSTOMER OPENS THE HOLE POSITION ACCORDING TO THE PRODUCT INCH)

第二步：如上图所示，将触摸盖板后面四周3M胶保护膜撕掉，露出3M胶
(STEP 2: AS SHOWN IN THE FIGURE ABOVE, PEEL OFF THE 3M ADHESIVE PROTECTIVE FILM AROUND THE BACK OF THE TOUCH COVER PLATE TO EXPOSE 3M ADHESIVE)

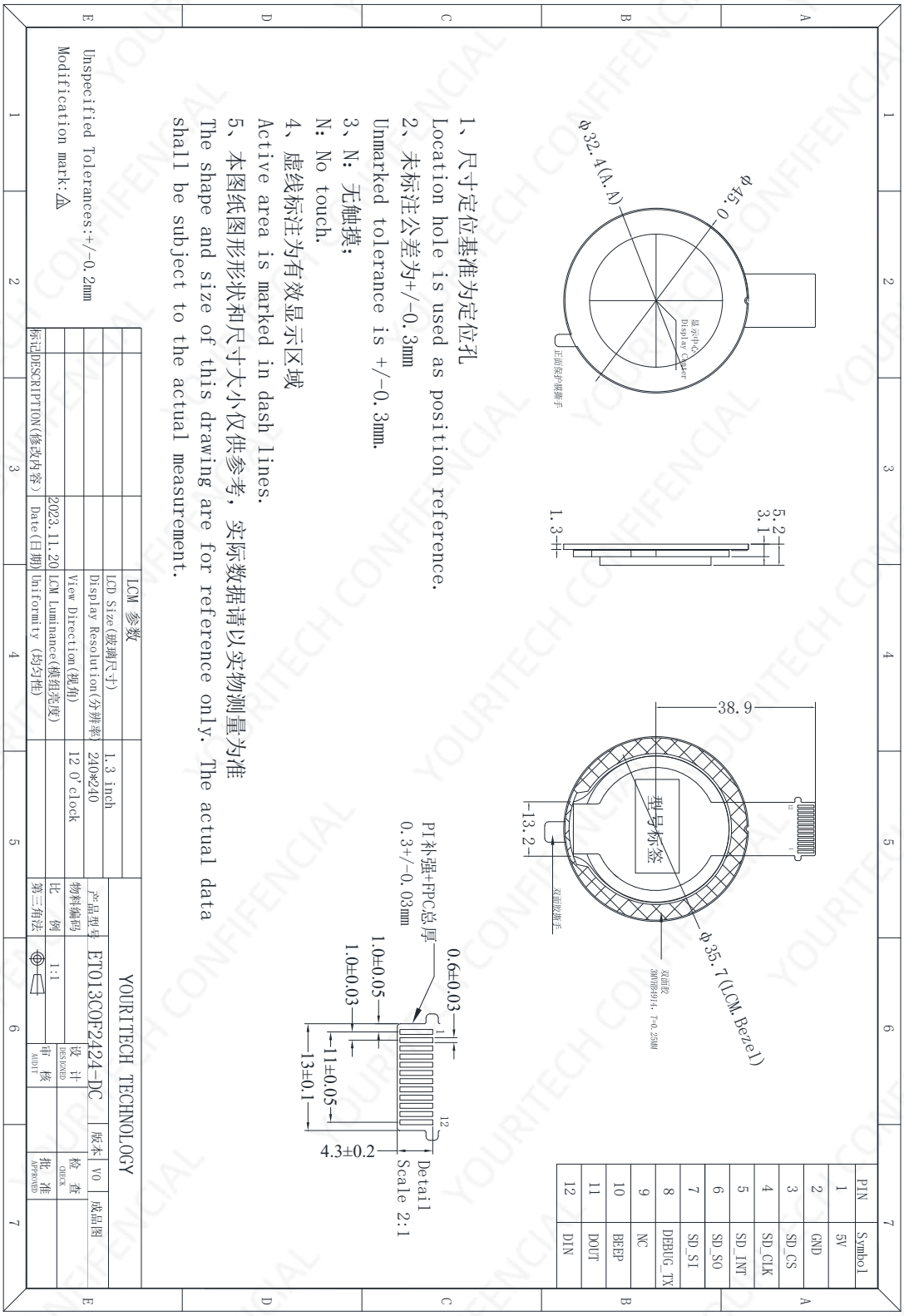
第三步： 如上图所示，压紧屏幕确保屏幕盖板的3M胶与机柜表面完全贴合
(STEP 3: AS SHOWN IN THE ABOVE SHOWS THAT THE SCREEN IS PRESSED FIRMLY TO ENSURE THAT THE 3M GLUE OF THE SCREEN COVER IS COMPLETELY ATTACHED TO THE SURFACE OF THE CABINET)



第四步： 如上图所示，将客户主版安装于外壳上并拧紧螺丝固定,并插入排线
(STEP 4: AS SHOWN IN THE FIGURE ABOVE, INSTALL THE CUSTOMER MASTER ON THE HOUSING AND TIGHTEN THE SCREWS TO SECURE IT, AND INSERT THE CABLE)

第五步：安装完成
(STEP 5: INSTALLATION COMPLETE)

4. Product Size



5. Pin Definition

Number	Definition	Description	Reference Diagram
1	5V	Power Supply	
2	GND	Power Ground	
3	SD_CS	SD card SPI chip selection	
4	SD_CLK	SD card SPI clock line	
5	SD_INT	The SD card is inserted into the detection pin	
6	SD_SO	SD card SPI output	
7	SD_SI	SD card SPI input	
8	DBG_TX	Debugging serial port log output	
9	NC	Undefined	
10	BEEP	Buzzer PWM output	
11	DOUT	Serial port screen output, connected to the user's RXD terminal	
12	DIN	Serial port screen input, connected to the user's TXD terminal	

6. Recommend Circuit

6.1 Buzzer circuit

The buzzer leads to a schematic representation of the reference circuit, as shown in Figure 6-1.

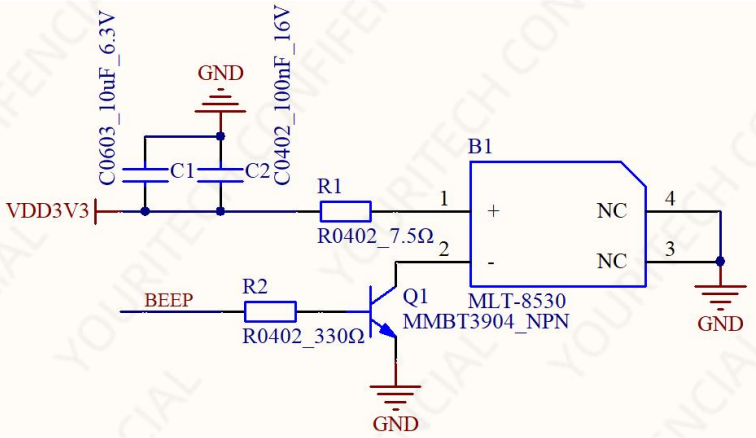


Figure 6-1 Buzzer reference circuit

6.2 SD card holder circuit

The SD card holder leads to a schematic representation of the reference circuit, as shown in Figure 6-2.

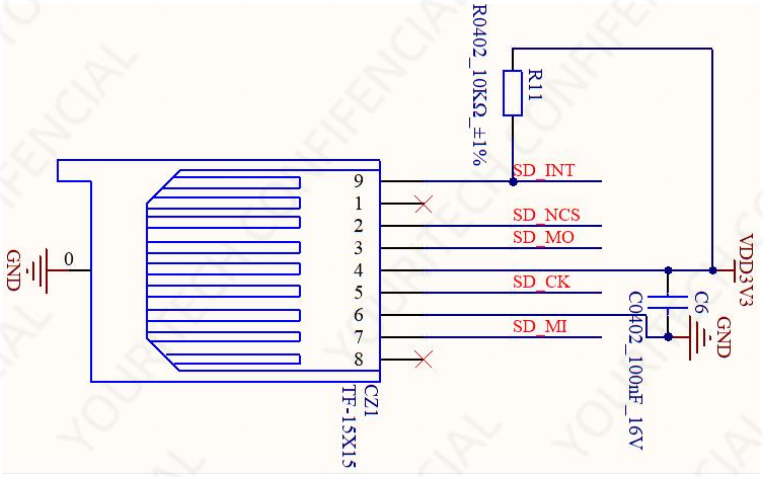


Figure 6-2 SD deck circuit schematic

7. Reliability Test

All serial port screens of YOURITECH Technology have carried out a series of process reliability tests before mass production: high and low temperature, ESD, pulse burst, radiation, touch life and other tests to ensure product quality, as shown in Figure 7-1.

Figure 7-1 Reliability Test Equipment

7.1 ESD Test

7.1.1 Execution standards

Execution Standards	IEC 61000-4-2

Test ambient temperature：25℃

Test ambient humidity：50%

Test process: Place the product on the test stand, lay down on the serial port screen buckle and the display area in order to make contact and air discharge as shown in Figure 7-2. Observe whether if the screen have reset or restarted,or abnormal display.

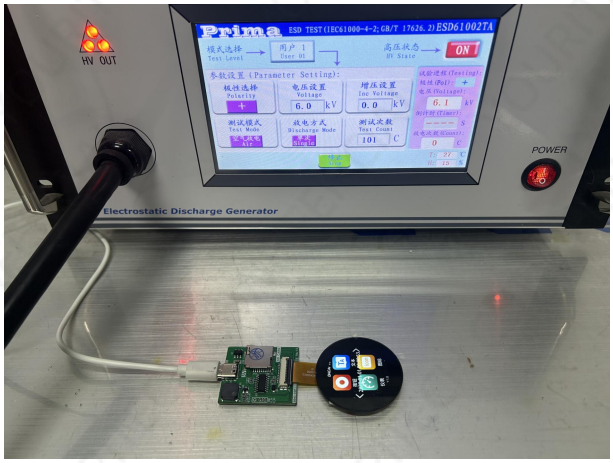


Figure 7-2 ESD test diagram

7.1.2 Test data

Product Model	Discharge type	Humidity	Test result
ET013COF2424-DC	air	±4KV	No restart, no abnormal display, normal function
Note: The current test tests are all product bare tests, and the ESD performance index of the whole machine will be higher if the screen and machine are well grounded on the actual product assembly machine, or the surface of the touchpad is protected by PVC or cover			

7.2 High and Low Temperature Aging Test

7.2.1 Test the environment

Test ambient temperature：-20～+70℃

Test ambient humidity：60%±3%RH

Test process: Place the product in the high and low temperature test box at an angle as shown in Figure 7-3. Pass the 72H high temperature, low temperature and high and low temperature alternating change aging test. Observe whether the screen resets and restarts during the test and after the test. Abnormalities, abnormal functions, etc.

Figure 7-3 High and low temperature aging test diagram

7.2.2 Test data

Product Model	Temperature	Humidity	Test results
ET013COF2424-DC	High temperature (70℃)	60%	No restart, no abnormal display, normal function
	Low temperature (-20℃)	60%	No restart, no abnormal display, normal function
	Alternating high and low temperature (-20~70℃)	60%	No restart, no abnormal display, normal function

7.3 Group Pulse Test

7.3.1 Execution standards

Execution standards	IEC 61000-4-4

7.3.2 Test environment

Test ambient temperature：25℃

Test ambient humidity：50%

Test process: Place the product on the test stand, and power the screen through the power supply after the pulse group generator is coupled to the pulse group, as shown in Figure 7-4. During the test, observe whether the screen resets, displays abnormally, or touches, abnormalities and other phenomena.

Figure 7-4 Group pulse test diagram

7.3.3 Test Data

Product Model	Test Standard			Test Results
ET013COF2424-DC	National standard 4			No restart, normal communication, normal function
	Voltage (KV)	Frequency (KHZ)	Time (S)	
	±4.0	5	120	

7.4 Radiation Test

7.4.1 Executive standard

Executive Standard	EN55022 ClassB

7.4.2 Test environment

The radiation test laboratory environment is shown in Figure 7-5.

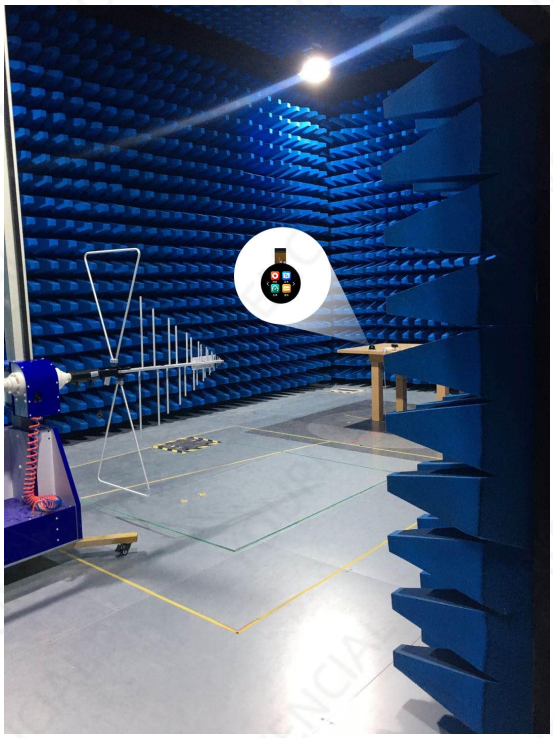
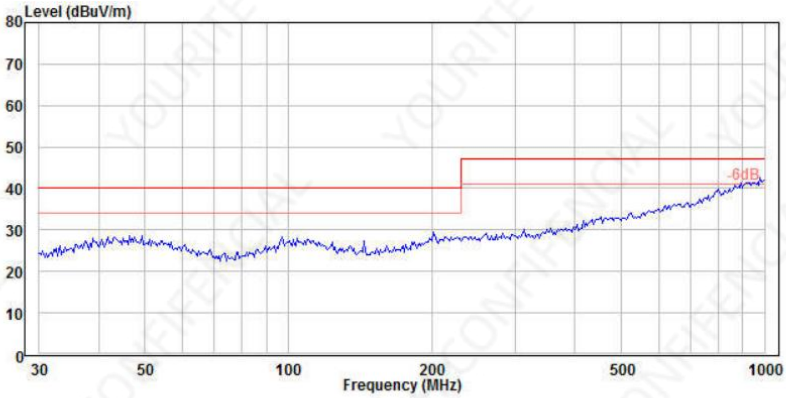


Figure 7-5 Radiation test chart

7.4.3 Test Data

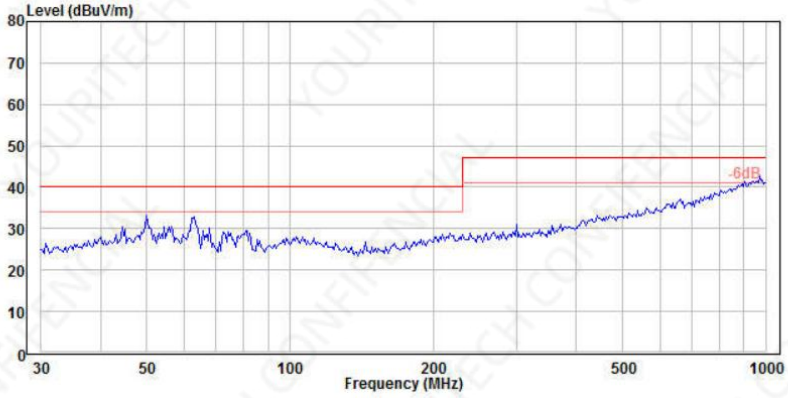
1. Radiation test horizontal test data, as shown in Figure 7-6.



Condition : CISPR 22 CLASS B QP 3M 3m factor\VULB9163.csv Horizontal
: RBW:120.000kHz VBW:300.000kHz SWT:0.400sec DET:Peak
制造商Manufacturer :
样品名称EUT :
样品型号Model :
测试标准Test Standard :
样品运行模式Operation Mode :
气候条件Climate Condition: 24.2℃;59.5%RH;101.2kPa
测试电压/频率 :
结果Result :
注释Comment :

Figure 7-6: Horizontal direction of the radiation test

2. Radiation test vertical test data, as shown in Figure 7- 7.




```
Condition            : CISPR 22 CLASS B QP 3M 3m factor\VULB9163.csv Horizontal
                     : RBW:120.000kHz VBW:300.000kHz SWT:0.400sec DET:Peak
制造商Manufacturer     :
样品名称EUT            :
样品型号Model          :
测试标准Test Standard  :
样品运行模式Operation Mode :
气候条件Climate Condition: 24.2℃;59.5%RH;101.2kPa
测试电压/频率          :
结果Result           :
注释Comment          :
```

Figure 7-7 Radiation test vertical

Note: This test data is the test data of the screen in a static screen.

8. Protocol Configuration

Most of the serial port screens launched by YOURITECH Technology default to the YOURITECH configuration instruction set, and users can run MODBUS RTU, XGUS and other protocols through the host computer configuration.

Open the VisualTFT host computer software, click [Tools] in the menu bar → [Protocol and Variable Settings], as shown in Figure 8-1, enter the protocol configuration interface, and users can choose to enable the corresponding protocol according to their needs, as shown in Figure 8-2.

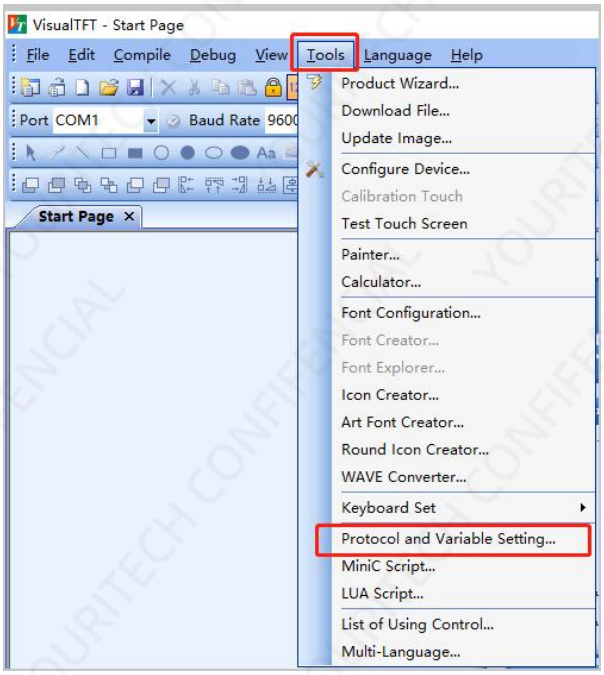


Figure 8-1 Protocol and variable setting

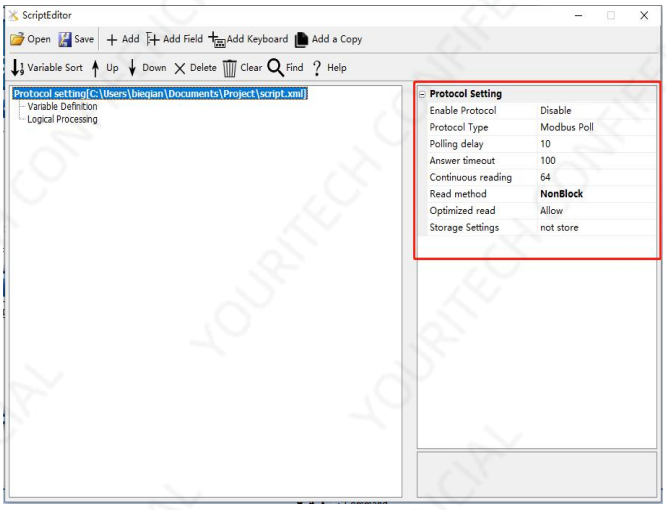


Figure 8 -2 Protocol configuration interface

9. LUA Script Configuration

The serial port screens of M-type, S-type and IoT series launched by YOURITECH Technology all support LUA language scripts. The serial port screen provides a wealth of LUA script API and callback interface, users can directly set and obtain the running status of all configuration controls by calling the API interface, combined with the written logic processing, the screen can complete the predetermined action without the participation of the external MCU, reducing the data communication between the MCU and the screen.

LUA is a lightweight scripting language with simpler syntax logic than C, and developers can get started directly. The LUA language comes with a well-functioning mathematical function library, string processing, JSON and other libraries, and has function support for common mathematical operations, such as square, sine cosine, and absolute value; Due to the high main frequency of the screen itself, all complex algorithms are processed by the screen, which greatly reduces the execution overhead of the user's MCU.

To write the LUA script of the project in the VisualTFT software, you can click [Tools] → [LUA Script Programming] in the menu bar to open it, as shown in Figure 9-1, and enter the LUA scripting interface, as shown in Figure 9-2.

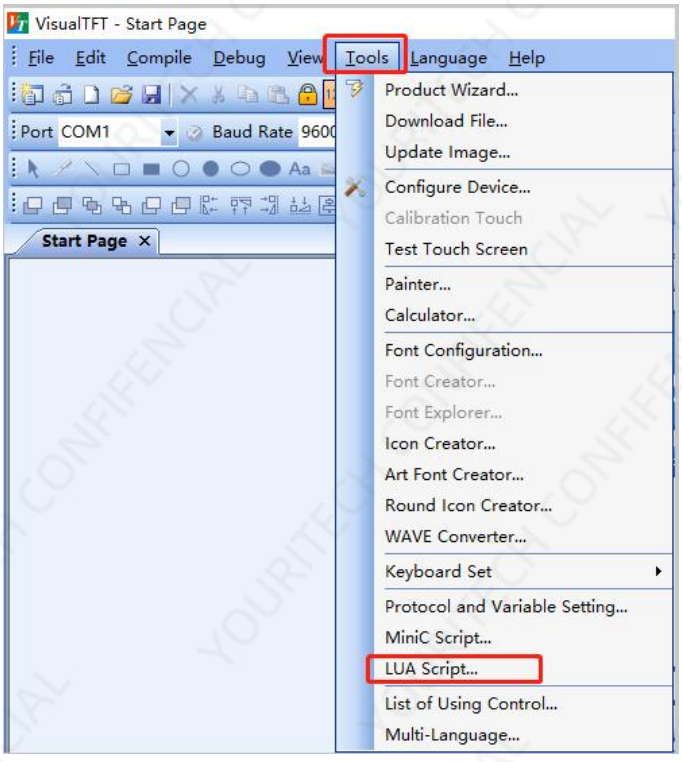


Figure 9-1 LUA script programming

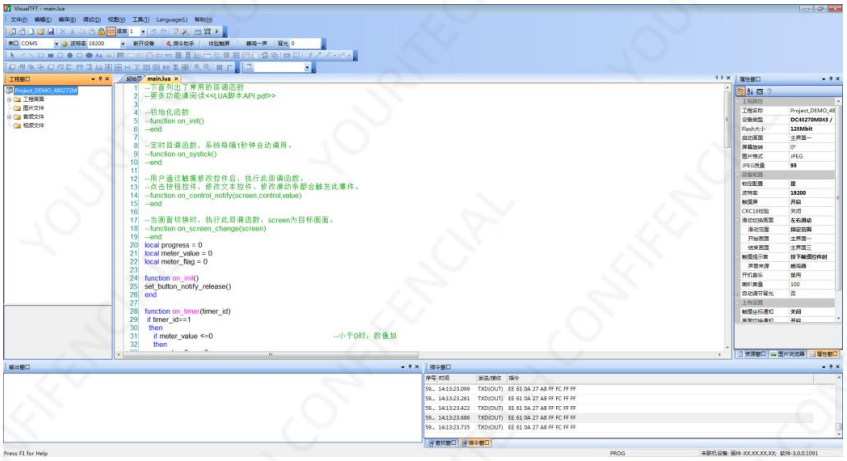


Figure 9-2 LUA scripting interface

10. Packaging and Physical Dimensions

Unit weight					
Net weight (KG)	0.05				
Packaging standard and total weight					
Box model	Box size (length * width * height, unit mm)	Number of layers	Quantity (PCS)/layer	Total quantity (pieces)	Total weight(KG)
Box 1	520*500*190mm	1	100	100	7.5

Note: The total weight does not include the weight of the accessory; The above weight information is an estimated weight for reference only, and the actual weight is subject to the actual weight.

11. Product Architecture

The industrial serial port screen launched by YOURITECH Technology is a serial display terminal integrating TFT display driver, picture font storage, GUI operation, audio playback and various configuration controls. The user microcomputer only needs to send and receive the corresponding serial port instructions to easily realize the display of text, pictures and curves.

The S series serial port screen is equipped with a 96M Cortex-M3 core 32-bit processor, which integrates PSRAM and FLASH storage, and the system architecture is shown in Figure 11-1.

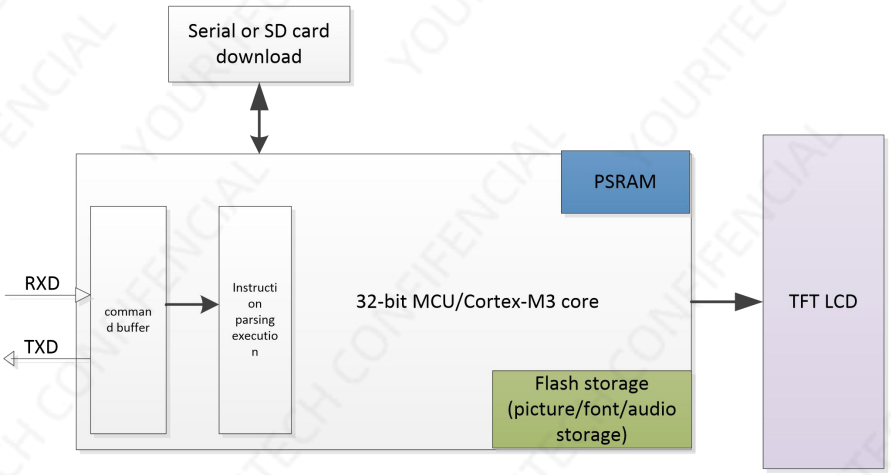


Figure 11-1 S series serial port screen internal structure diagram

The main advantages of choosing a high-performance 32-bit dual-core processor architecture are:

1. A dedicated 32-bit 400M SOC processor optimized for picture display, with a 2D acceleration engine and JPEG picture hardware decoding, so that the display can be combined with various special effects, and the display effect is smooth and gorgeous.

2. No operating system, continuous 24*365h hours of uninterrupted power can work reliably, no garbage redundant files.

12. Develop Software

VisualTFT is a serial port screen development and debugging software independently developed by YOURITECH, integrating the first "Virtual TFT Simulator" simulator in China, which is free for life. After the user creates a new project, import the designed art pictures, and then configure the buttons and other controls in each screen, simulate correctly, and finally download the entire project to the serial port screen. The software interface is shown in Figure 12-1.

Figure 12-1 Main interface of VisualTFT

Any user only needs 3 steps to complete complex human-computer interaction design within 30 minutes.

1. Prepare art materials.

Arrange for artists to design the pictures required for the product, such as the boot screen, text background, button icon, and prompt box.

2. Use the supporting VisualTFT software for screen editing, script writing, control configuration and picture download.

First, using the supporting host computer VisualTFT software, the pre-designed art pictures are arranged and configured for interface, and then the "virtual serial port screen" is run for simulation, and finally the entire project can be downloaded to the internal memory of the serial port screen through SD/UART (depending on the hardware configuration of different models). PC software assigns a unique ID number to each picture, picture and control in the project. Users can also write the required logic control and algorithms through the script editor embedded in the host computer to reduce the communication frequency between the screen and the motherboard.

3. The user's single-chip microcomputer monitors and sends the corresponding serial port command control screen display.

After the project is downloaded to the screen, once a button is pressed on the screen, the user's MCU serial port will receive the button ID information or coordinate value uploaded on the screen. By parsing the ID number, the user can obtain the screen position and functional attributes of the current button, so that the relevant peripheral device actions or screen update display can be

controlled.

For non-touch products, the user microcontroller does not need to listen to the information uploaded by the button ID, but only needs to send relevant instructions for screen switching and text picture display.

12.1 What is Virtual TFT Simulation

"Virtual TFT simulation" is the first domestic exclusive serial port screen emulator developed by YOURITECH Technology . After the user
installs the VisualTFT software of the host computer, it can be run and used. The simulation results of the virtual serial port screen are exactly the same as the real serial port screen. Therefore, there is no need to purchase hardware during the pre-development evaluation, and it can communicate with each other through its own single-chip RS232 serial port, and click on the button will immediately upload the button control information, as shown in Figure 12-2. Once the developer has debugged it, the real hardware does not need to be debugged.

Figure 12-2 user microcontroller serial port and "virtual serial screen" online debugging

12.2 Keil is bound to debug with the virtual TFT simulation

In order to further improve the development efficiency, users can also bind Debug debugging with the "virtual TFT simulation" through the Keil development environment. When the program is single-step debugging, all running results can be presented on the "virtual TFT simulation", which greatly saves the engineer's development time, as shown in Figure 13-3. Once the project interface is changed, users no longer need to re-download pictures to the serial port screen, and all pre-project evaluations can be completed based on the PC.

Figure 12-3 Keil development environment and virtual serial screen binding debugging

Note: Virtual serial screen debugging requires keil software support, in the Debug process, enter dirvtreg in the command serial port, you need to list SxIN (depending on the microcontroller, x may represent 0, 1, 2), if there is listed on behalf of keil has been the serial port of the microcontroller virtual to the register, so that you can use.

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