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Product Datasheet

Medical Grade ET037BA2496-DC/C Datasheet V1.1

ISO9001:2015 Quality System Certification

Customer			
Keywords	Medical grade, M series, 3.7 inch, 240*960 IPS laminated screen, TTL, band configuration, LUA script, video		
Model	ET037BA2496-DC/C		
Signature of Customer		Signature of Engineer	
Date		Date	

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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 following is a reference drawing of the appearance of different models of this size, as shown in Figure 1-1 and Figure 1-2.

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 3.7-inch capacitive touch reference diagram

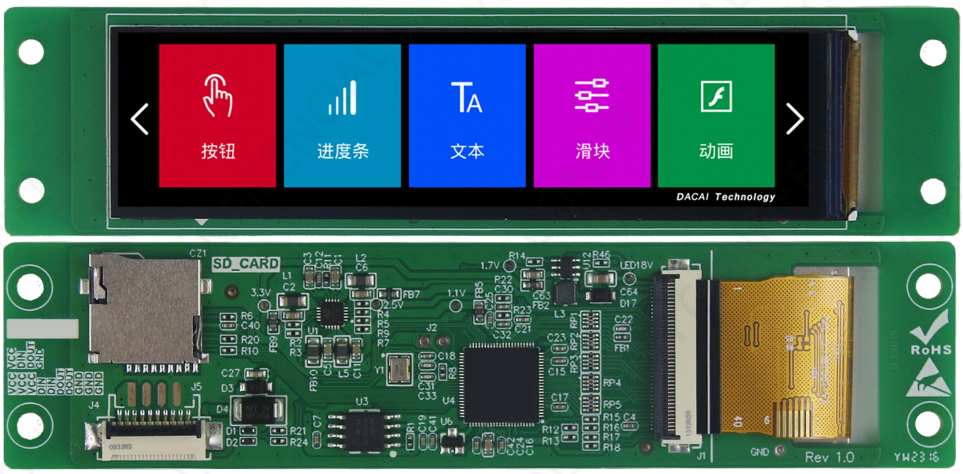


Figure 1-2 3.7 inch non-touch reference diagram

1.2 Hardware configuration

The following is a reference diagram of the hardware configuration of a product of this size, taking capacitive touch as an example, as shown in Figure 1-3.

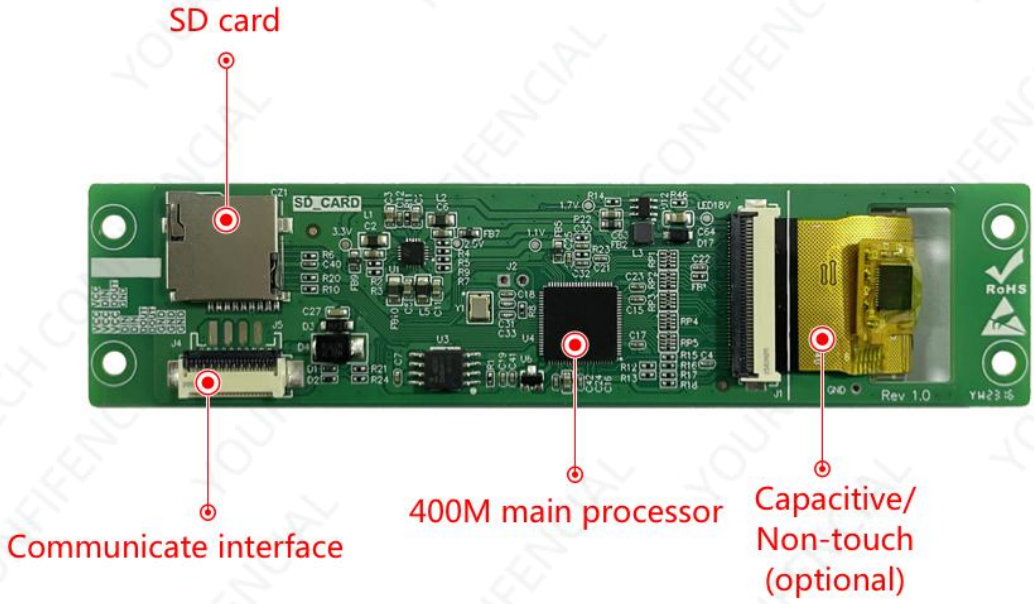


Figure 1-3 Hardware configuration diagram

1.3 Debugging tool

The following is a reference diagram of the debugging tool of this product, taking capacitive touch as an example, as shown in Figure 1-4.

Figure 1-4 Debugging tool diagram

◆ Development and debugging accessories (optional)	
Name	**Accessory Model**
Power supply	Power adapter, 5V 2A DC5.5*2.1mm Tite
USB to TTL debug board	Standard USB to TTL debug board, V1.1
USB cable	USB cable, mini usb cable, length 1.5M gray
SD card (with card reader)	Kingston 8G

2. Product Specifications

◆ Product Parameters	
Model description	ET037BA2496-DCC(TTL, Capacitive touch) ET037BA2496-DC(TTL, No touch)
Product Series	M series
Core processor	400M SOC processor
Operating system	No operating system, power on and running
Protocol type	The default large color configuration instruction set, the host computer can be configured to run MODBUS RTU, XGUS protocol
Scripting language	LUA scripts, which can run user-written logic, protocol and algorithm functions inside the screen
Size	3.7 inch
Resolution	240*960
Installation orientation	It supports 0°, 90°, 180° and 270° rotation mounted displays
Storage space	64Mbit
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 100 full-screen images (70KB per 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(±0.2)
Power Consumption	Darkest backlight：0.5W
	Brightest backlight：0.8W
Communication Method	TTL
Communicate Baud-rate	1200～921600bps, typical baud rate：115200bps
Communication Connector Specifications	FPC1.0-10P
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 = 91.5mm*22.9mm
Product Size (L*W*H)	126.8mm*30.4mm*7.0mm（MAX，includ TP）

Supporting Host Computer Software	VisualTFT®
Operating Temperature	-20～+70℃
Storage Temperature	-30～+80℃
Video playback	MP4 video format, sharing storage space with pictures. If a video file with a resolution of 800*600, a video bitrate of 3000Kbps, an audio bitrate of 166Kbps, and a frame rate of 25Hz occupies 21.9MB/min

◆ Reliability Parameters	
Operating Temperature	-20～+70℃
Storage Temperature	-30～+80℃
ESD Test	Reboot occasionally：Air：±10KV No restart：Air：±8KV
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

◆ 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	It uses traditional YOURITECH processors and has been in continuou s supply for many years

◆ LCD	
Display Type	IPS LCD
Backlight Tube	LED

Brightness（cd/m²）	350
Backlight Life（h）	>20,000
Contrast Ratio	1000:1
Visual Angle（L/R/T/B）	85/85/85/85

◆ Touch Panel	
Touch Type	Capacitive touch screen
Capacitive Screen Touch Mode	Point, swipe touch
Capacitive Screen Light Transmittance	More than 90%
Capacitive Screen Touch Times	The number of capacitive screen touches is theoretically infinite, and the touch life is related to the working environment (dust, humidity)
Capacitor Cover Plate Customization	The "glass cover plate + capacitive touch" integrated lamination service can be customized according to the size of the user's drawing

◆ 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. Reliability Test

All serial port screens of YOURITECH Technology have carried out a series of process r eliability tests before mass production: high and low temperature, ESD, pulse burst, radiation, touc h life and other tests to ensure product quality, as shown in Figure 3-1.

Figure 3-1 Reliability Test Equipment

3.1 ESD Test

3.1.1 Implementation Standards

Execution Standards	IEC 61000-4-2

3.1.2 Environment Test

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 3-2. Observe whether if the screen have reset or restarted,or abnormal display.

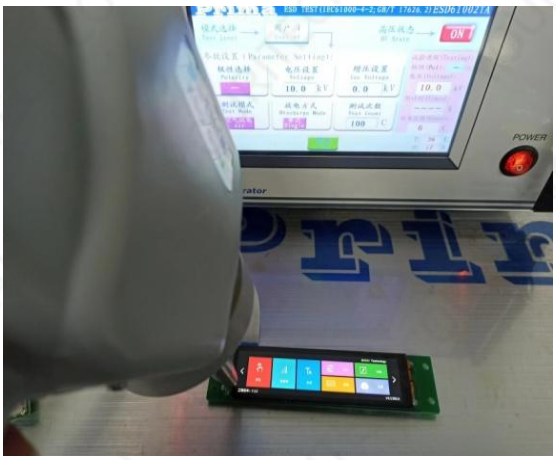


Figure 3-2 ESD test diagram

3.1.3 Test data

Product Model	Discharge type	Humidity	Test result
ET037BA2496-DCC	Air	±8KV	No restart, no abnormal display, normal function
ET037BA2496-DC	Air	±10KV	Occasional reset and restart, no abnormal display, normal function
Note: The current test test is the product exposure test, the actual product assembly machine, keep the screen and the machine well grounded, or the surface of the touchpad is protected by PVC or cover, the ESD performance index of the whole machine will be higher.			

3.2 High and Low Temperature Aging Test

3.2.1 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 3-3. 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 3-3 High and low temperature aging test diagram

3.2.2 Test data

Product Model	Temperature	Humidity	Test results
ET037BA2496-DCC ET037BA2496-DC	High temperature (70℃)	60%	No reboot, no abnormal display, normal function
	Low temperature (-20℃)	60%	No reboot, no abnormal display, normal function
	Alternating high and low temperature (-20~70℃)	60%	No reboot, no abnormal display, normal function

3.3 Group Pulse Test

3.3.1 Execution standards

Executive Standard	IEC 61000-4-4

3.3.2 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 3-4. During the test, observe whether the screen resets, displays abnormally, or touches, abnormalities and other phenomena.

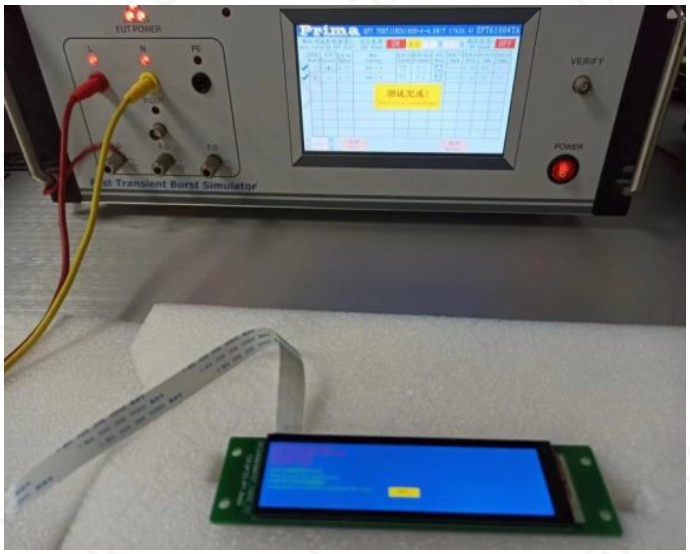
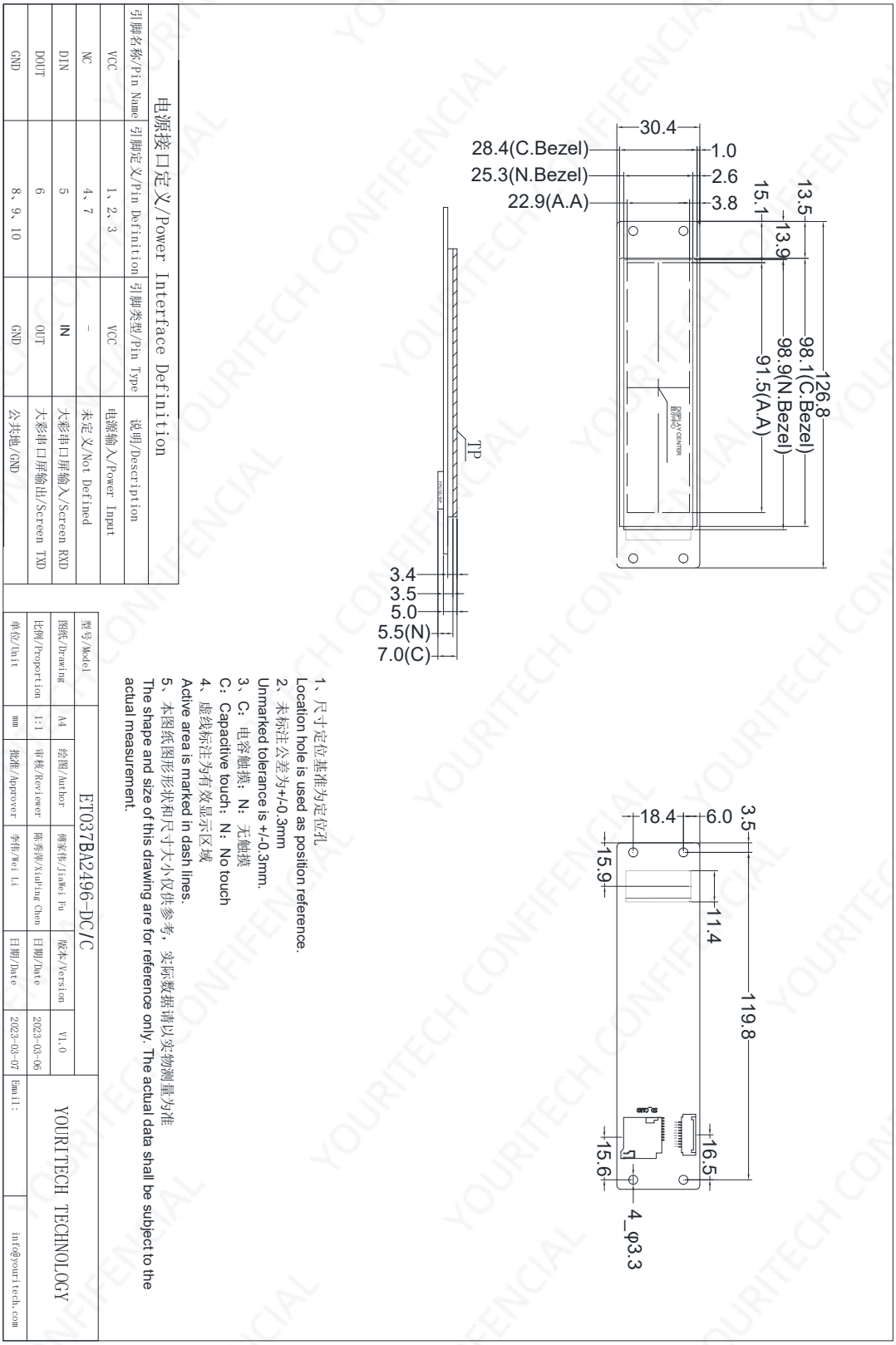


Figure 3-4 Group pulse test diagram

3.3.3 Test Data

Product Model	Test Standard			Test Result
ET037BA2496-DCC ET037BA2496-DC	National standard 4			No restart, normal communication, normal function
	Voltage (KV)	Voltage (KV)	Frequency (KHZ)	
	4.0	5	120	

4. Product Size



电源接口定义/Power Interface Definition				
引脚名称/Pin Name	引脚定义/Pin Definition	引脚类型/Pin Type	说明/Description
VCC	1、2、3	VCC	电源输入/Power Input
NC	4、7	-	未定义/Not Defined
DIN	5	IN	大彩串口屏输入/Screen RXD
DOUT	6	OUT	大彩串口屏输出/Screen TXD
GND	8、9、10	GND	公共地/GND

1、尺寸定位基准为定位孔
Location hole is used as position reference.
2、未标注公差为+/-0.3mm
Unmarked tolerance is +/-0.3mm.
3、C：电容触摸；N：无触摸
C：Capacitive touch；N：No touch
4、虚线标注为有效显示区域
Active area is marked in dash lines.
5、本图纸图形形状和尺寸大小仅供参考，实际数据请以实物测量为准
The shape and size of this drawing are for reference only. The actual data shall be subject to the actual measurement.

型号/Model	ET037BA2496-DC/C			版本/Version	V1.0
图纸/Drawing	A4	绘图/Author	傅家伟/JiaWei Fu	日期/Date	2023-03-06
比例/Proportion	1:1	审核/Reviewer	陈秀珍/XiuPing Chen	日期/Date	2023-03-07
单位/Unit	mm	批准/Approver	李伟/Wei Li	日期/Date	2023-03-07

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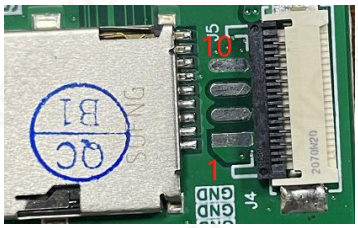
5. Pin Definition

Number	Definition	Description	Reference Diagram
1、2、3	VCC	Power input 5V (minimum 4.8V start)	
4、5	DIN	Serial port screen input, connected to the user's TXD terminal	
6、7	DOUT	Serial port screen output, connected to the user's RXD terminal	
8、9、10	GND	Power Ground	

6. Protocol Configuration

Most of the serial port screens launched by YOURITECH Technology default to the YOU RITECH configuration instruction set, and users can run MODBUS RTU, XGUS and other proto cols 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 6 -1, enter the protocol configuration interface, and users can choose to enable the corresponding protocol according to their needs, as shown in Figure 6 -2.

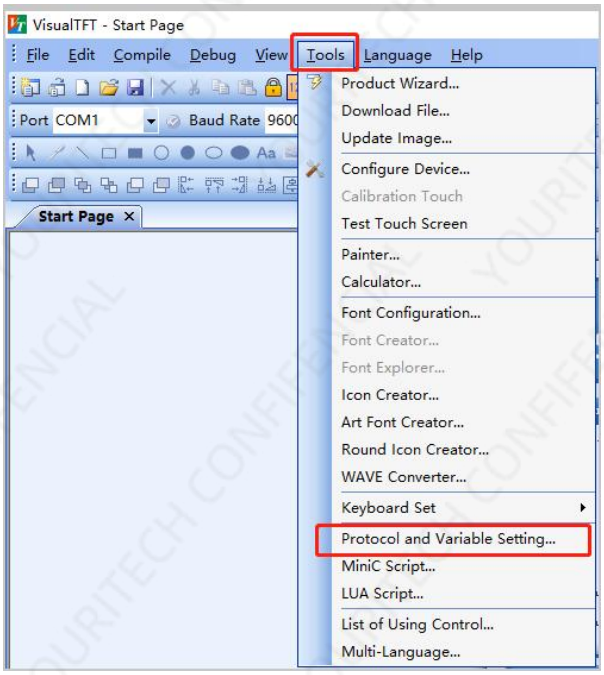


Figure 6-1 Protocol and variable setting

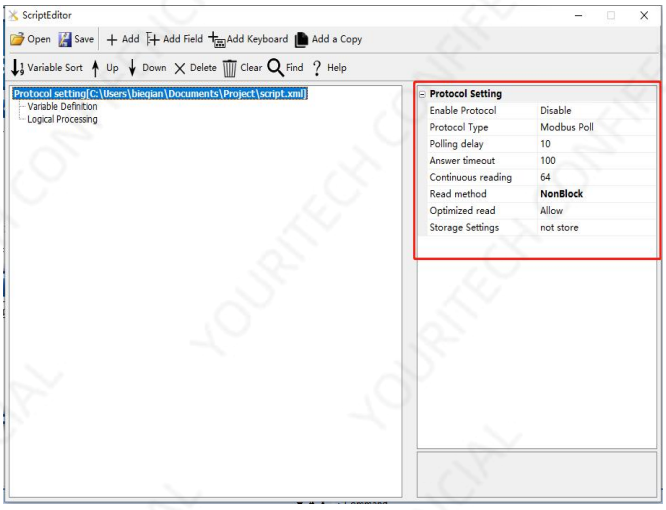


Figure 6-2 Protocol configuration interface

7. LUA Script Configuration

The serial port screens of S-type, M-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 7-1, and enter the LUA scripting interface, as shown in Figure 7 -2.

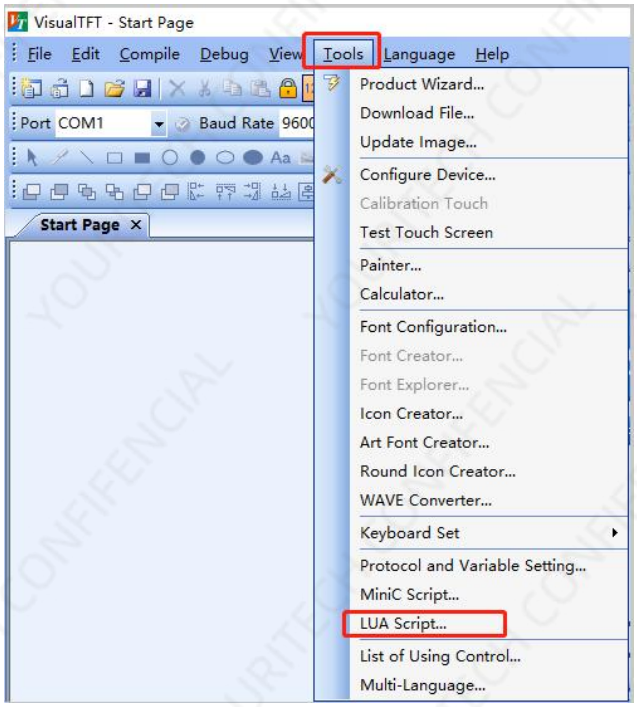


Figure 7-1 LUA script programming

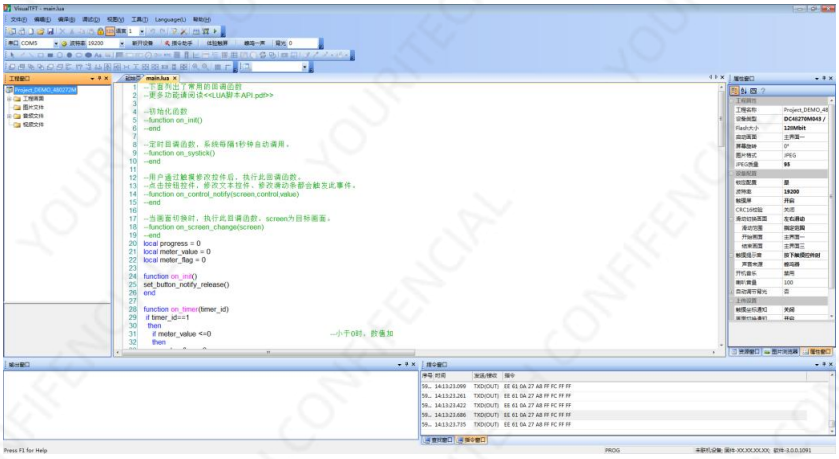


Figure 7-2 LUA scripting interface

8. Packaging and Physical Dimensions

Unit weight					
Net weight (KG)	0.03				
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	478*340*275	1	25	25	-
Box 2	616*478*275	1	100	100	-

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.

9. 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.

M series serial screen processor adopts 32-bit 400M SOC processor, which integrates SDR memory and JPEG picture decoding and other functions, and the system architecture is shown in Figure 9 -1.

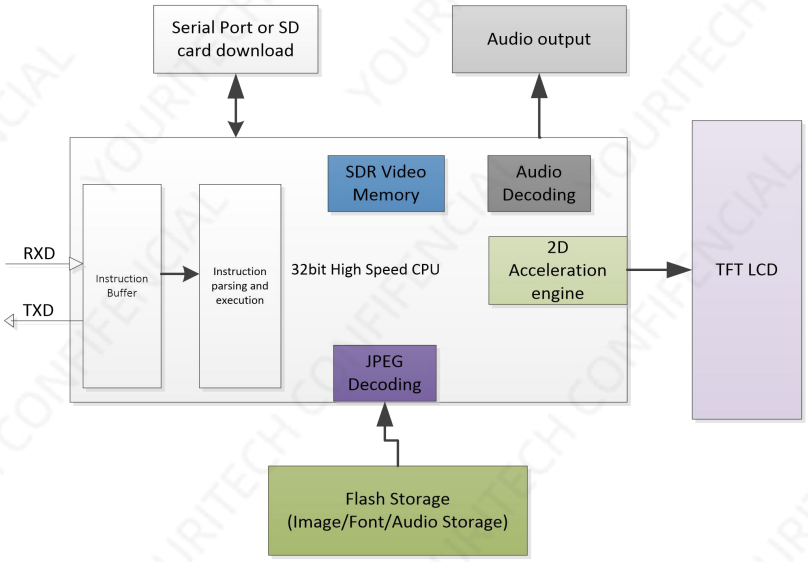


Figure 9-1 M series serial port screen internal structure diagram

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.

10. 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 10-1.

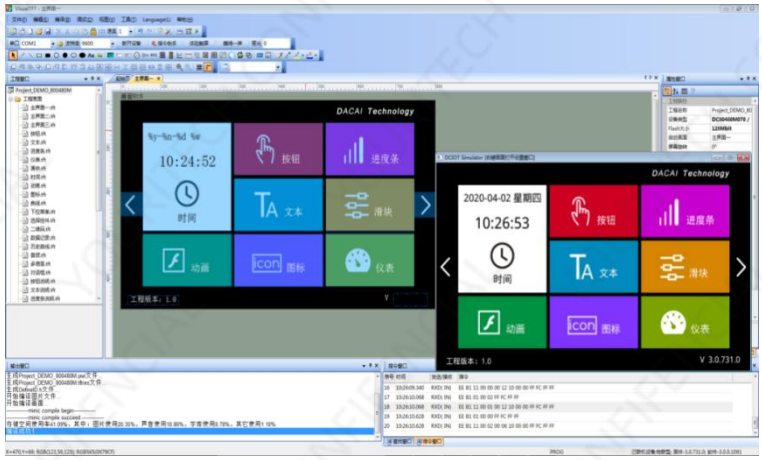


Figure 10-1 Main interface of VisualTFT

Any user only needs 3 steps to complete complex HMI design within 30 minutes.

1. *Prepare art assets*

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, scripting, control configuration and image 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 screen, 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 micro-controller 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.

10.1 What is Virtual TFT Simulation

"Virtual TFT simulation" is the first domestic exclusive serial port screen emulator developed by YOURITECH Technolog. After the userinstalls 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 10-2. Once the developer has debugged it, the real hardware does not need to be debugged.

Figure 10-2 Online debugging of the serial port of the user single-chip microcomputer and the "virtual TFT simulation"

10.2 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 10-3. 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.

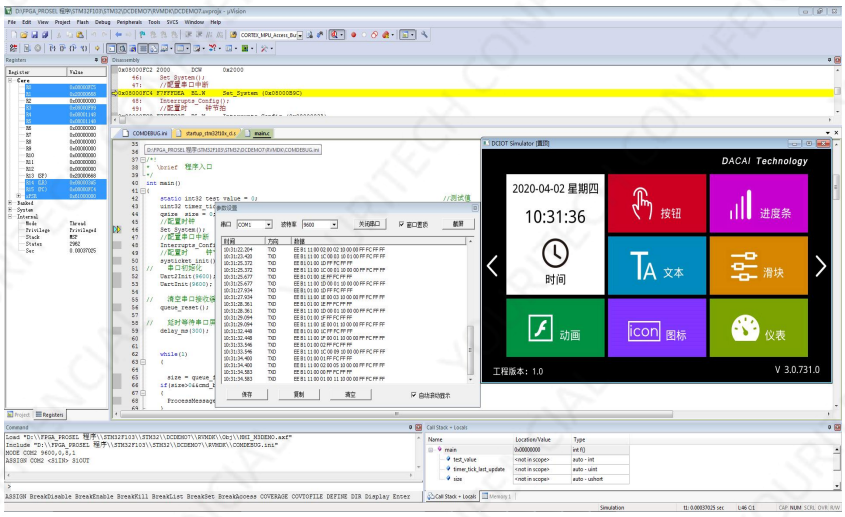


Figure 10-3 The Keil development environment is bound to the virtual TFT simulation for debugging

Note: The debugging of the virtual TFT simulation needs keil software support, in the debug process, enter dirvtreg in the command serial port, you need to list SxIN (according to the single-chip microcomputer, x may represent 0, 1, 2), if there is a list of representatives keil has virtualized the serial port of the single-chip microcomputer to the register, so that it can be used.

11. Disclaimer

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