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Custom Display

Mechanical design



Product
Datasheet

E T 0 4 0 E W 4 8 4 8 - D C DatasheetV1.0

ISO9001:2015Quality system certification

Customer			
keywords	EW series, 4.0 inch, 480*480, with configuration, video,WIFI, 86 boxes		
Model	ET040EW4848-DC		
Signature of Customer		Signature of Engineer	
Date		Date	



Version Record

Version	Date	Reason for modify	Page	Written by	Reviewed by
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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 the appearance reference diagram 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 4.0-inch capacitive touch reference diagram

1.2 Hardware configuration

The following is a reference diagram of the hardware configuration of this product, as shown in Figure 1-2 and Figure 1-3.



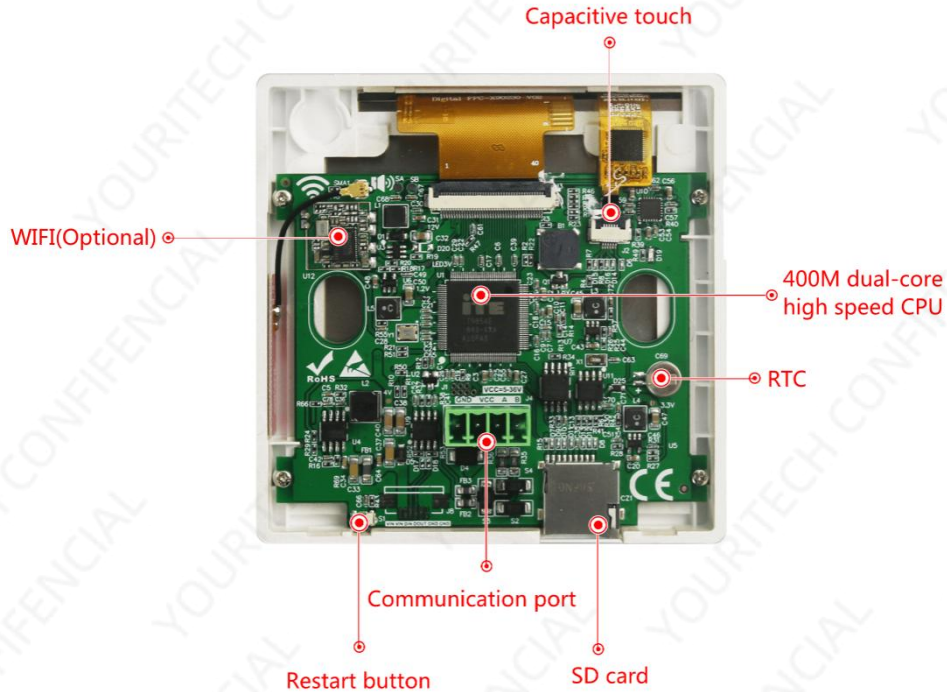


Figure 1-2 Hardware configuration diagram

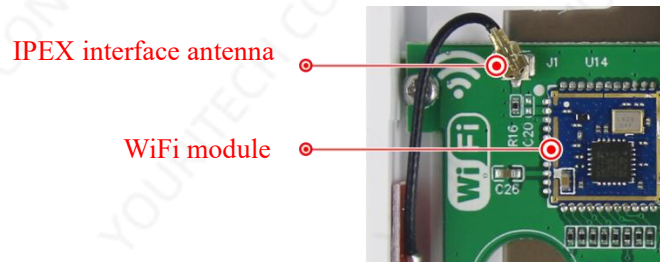


Figure 1-3 WIFI configuration

1.3 Debugging tool

The following is a reference diagram of the debugging tool for this product, as shown in Figure 1-4.



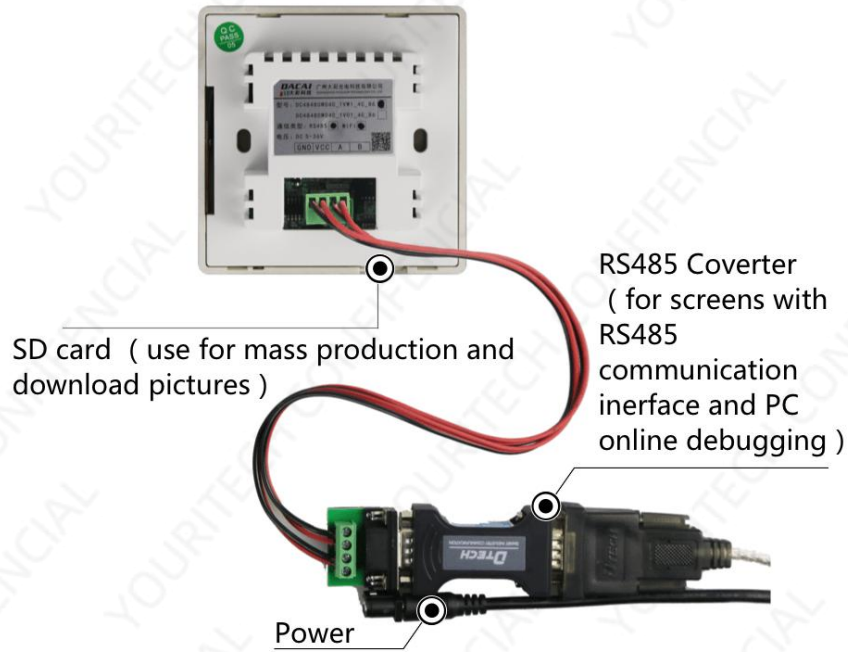


Figure 1-4 Debugging tool diagram



2. Product Specifications

◆ Product parameters	
Model description	ET040EW4848-DC, Golden (RS485, with WiFi, Capacitive touch, Golden) ET040EW4848-DC, White (RS485, with WiFi, Capacitive touch, White) ET040EW4848-DC, Golden (RS485, no WiFi, Capacitive touch, Golden) ET040EW4848-DC, White (RS485, no WiFi, Capacitive touch, White)
Product Series	IoT-oriented
Core Processor*	800MHz 32-bit dual-core processor
Operating system	Embedded real-time operating system, running after power-on 4S
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	4.0 inch
Resolution	480*480
Installation orientation	Supports 0, 90, 180 and 270 degree rotation installation display
Storage space	128Mbit
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	Support JPEG, PNG (semi-transparent/full transparency) compression, support any size picture storage. The total can store about 138 JPEG full-screen images (calculated by size 86.7KB/sheet, BMP format is not recommended). The image compression ratio is different, and this value fluctuates up or down
Color	65K color, 16-bit RGB
Voltage	5-36V
Power Consumption	Darkens backlight, No horn: 1.2W
	Brightens backlight, No horn: 2.4W
Communication Method	RS485
Communicate Baud-rate	RS485:1200~115200bps, typical baud rate: 9600bps
Communication Connector Specifications	2EDG3.81-4P
Image Local Download	SD 卡/RS485/WIFI
Real-time clock (RTC)	Support countdown, timer, year, month and day and other time display
Screen Active Display	Length*width = 71.9mm×70.2mm



Area (AA)	
Product Size (L*W*H)	Length*width*height = 90.7mm×90.7mm×27.9mm (Maximum height after installation: 12.9mm)
Supporting Host Computer Software	VisualTFT®
Sound playback	Optional
Video Playback	MP4 video format, sharing storage space with pictures. If a video file with a resolution of 800*480, a video bitrate of 2400Kbps, and a frame rate of 25Hz occupies 17.8MB/minute of storage
WIFI	It adopts BL-M8189FS6 module, supports 2.4GHz-2.48GHz frequency band, supports network card mode and hotspot mode, can be configured as wireless serial port transparent transmission mode, can use TCP/IP protocol, FTP protocol, HTTP protocol
Three-Conformal Paint Process	None (optional)

◆ 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 "virtual serial port screen", which does not need to be connected to the hardware, and Keil IDE is directly bound to it for debugging
Startup time	It can be displayed when powered on
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
Boot LOGO replacement	Support SD card insertion and replacement
Remote upgrade	Support remote serial port to upgrade screen firmware, project files, specified pictures, configuration files and font libraries, etc. (WIFI model required)
Information push	Support cloud push video or advertising display, or mobile APP and screen communication display (WIFI model required)
Multi-language capabilities	Factory preset up to 15 global languages of any country, one-click switch of the required language, without the need for multiple sets of UI
Logical operation processing	The LUA script parser is embedded in the host computer, and users can customize various complex logical relationships and protocols on the screen, meeting 99.9% of the product function requirements of customers
Reliability	Products are tested for high and low temperature, ESD, group pulse and radiation by industry standards
Life Cycle	Using traditional YOURITECH processors, non-stop goods for many years



◆ LCD Display	
Display Type	IPS LCD
Backlight Tube	LED
Brightness (cd/m ²)	250
Backlight Life (h)	>20,000
Contrast Ratio	800:1
Visual Angle (L/R/T/B)	80/80/80/80

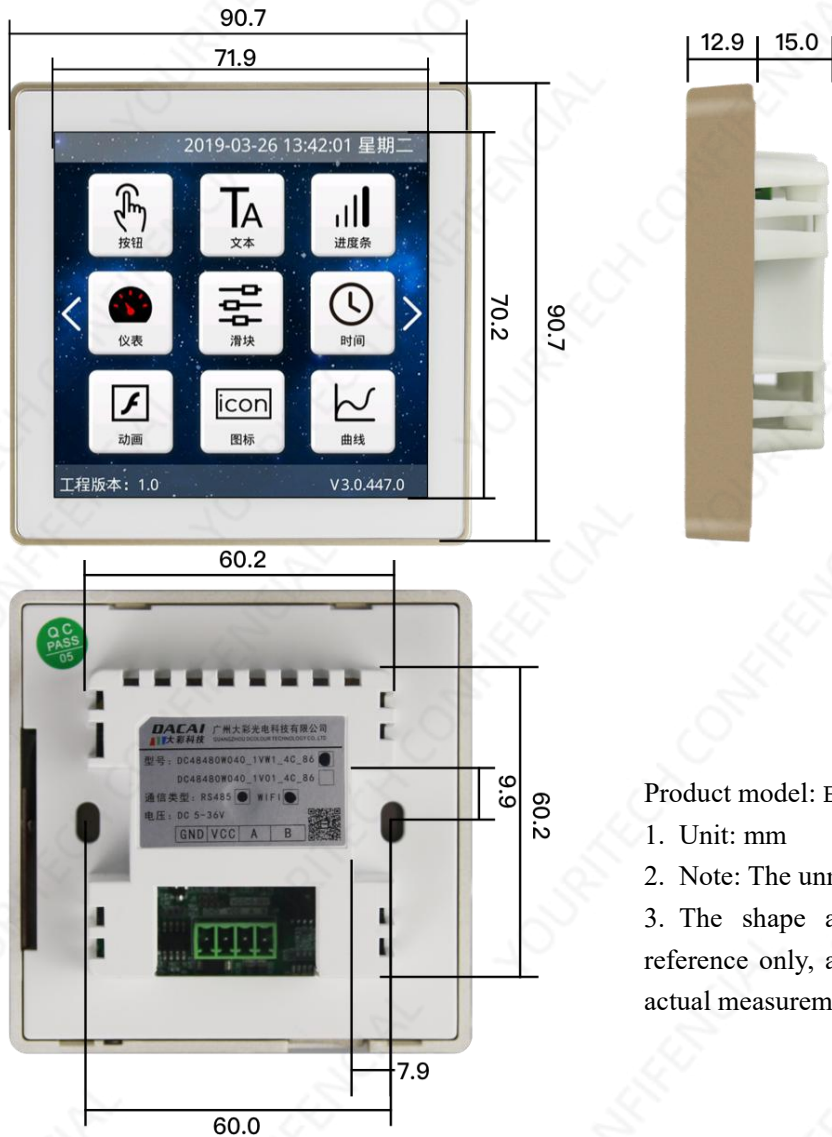
◆ Touch Panel	
Touch Type	Capacitive touch screen
Capacitive Screen Touch Mode	Point, swipe touch
Capacitive Screen Light Transmittance	More than 90%
Capacitive Screen Touch Times	The number of capacitive screen touches is theoretically infinite, and the touch life is related to the working environment (dust, humidity)

◆ Environment & Certification	
Operating Temperature	-20~+70°C
Storage Temperature	-30~+80°C
Vibration test	10 to 25Hz (X, Y, Z direction 2G 30 minutes)
Certification	ROHS, CE certification (EMI class: EN55022 ClassB standard)

◆ Customized services	
Customization fee	One-time signing of 1000PCS contract, some can be exempted from customization fee
Communication interface	Can be customized parallel bus, CAN, Zigbee, Ethernet or WIFI and other external communication interfaces
Hardware circuit	Can customize PCB size, circuit thickness, add user circuit, military-grade temperature display, etc
Software customization	Customize special instructions or controls according to user needs, reduce the difficulty of user development
Art services	Can provide picture art and product structure design services
Other	Customized on demand, to meet all the needs of users



3. Product Size

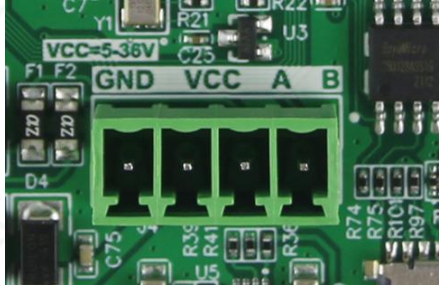


Product model: ET040EW4848-DC

1. Unit: mm
2. Note: The unmarked tolerance is ± 0.1 mm
3. The shape and size of the drawing are for reference only, and the actual data is subject to the actual measurement



4. Pin Definition

Number	Definition	Description	Reference Diagram
1	GND	Power ground	
2	VCC	Power supply	
3	A	RS485 data A side	
4	B	RS485 data B side	



5. Reliability Test

All serial port screens of YOURITECH 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 5-1.



Figure 5-1 Reliability Test Equipment

5.1 ESD Test

5.1.1 Implementation Standards

Execution Standards

IEC 61000-4-2

5.1.2 Environment Test

Test ambient temperature: 25°C

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 5-2. Observe whether if the screen have reset or restarted, or abnormal display.





Figure 5-2 ESD test diagram

5.1.3 Test data

Product Model	Discharge type	Humidity	Test result
ET040EW4848-DC	air	±10KV	No restart, no abnormal display, normal function
<i>Note: The current test is the product exposed test, the actual product assembly machine, keep the screen and the machine well grounded, or the surface of the touch board is protected by PVC or cover, the ESD performance index of the whole machine will be higher</i>			

5.2 High and Low Temperature Aging Test

5.2.1 Test the environment

Test ambient temperature: -20~+70°C

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 5-3. 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 5-3 High and low temperature aging test diagram

5.2.2 Test data

Product Model	Temperature	Humidity	Test results
ET040EW4848-DC	High temperature (70°C)	60%	No reboot, no abnormal display, normal function
	Low temperature (-20°C)	60%	No reboot, no abnormal display, normal function
	Alternating high and low temperature (-20~70°C)	60%	No reboot, no abnormal display, normal function

5.3 Group Pulse Test

5.3.1 Execution standards

Executive Standard	IEC 61000-4-4
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5.3.2 Test environment

Test ambient temperature: 25°C



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 5-4. During the test, observe whether the screen resets, displays abnormally, or touches, abnormalities and other phenomena.



Figure 5-4 Group pulse test diagram

5.3.3 Test Data

Product Model	Test Standard			Test Result
ET040EW4848-DC	National standard 4			No restart, normal communication, normal function
	Voltage (KV)	Frequency (KHZ)	Time (S)	
	4.0	100	120	



6. Protocol Configuration

Most of the serial port screens launched by YOURITECH 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 6 -1, enter the protocol configuration interface, and users can choose to enable the corresponding protocol according to their own needs, as shown in Figure 6 -2.

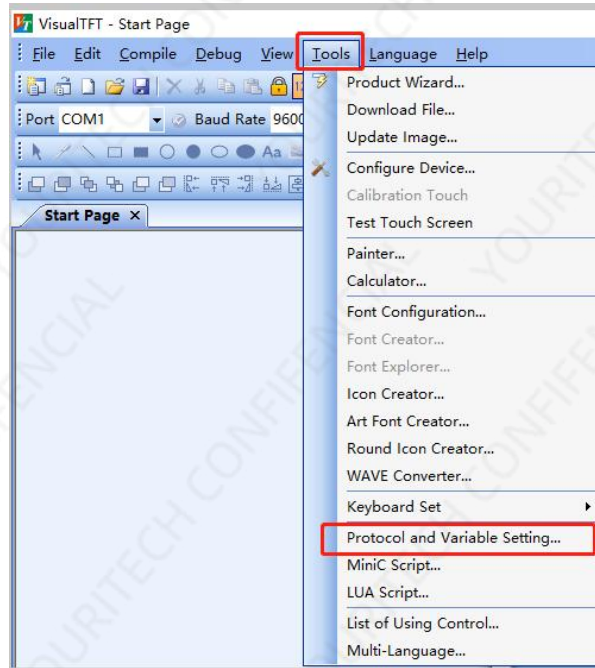


Figure 6-1 Protocol and variable settings

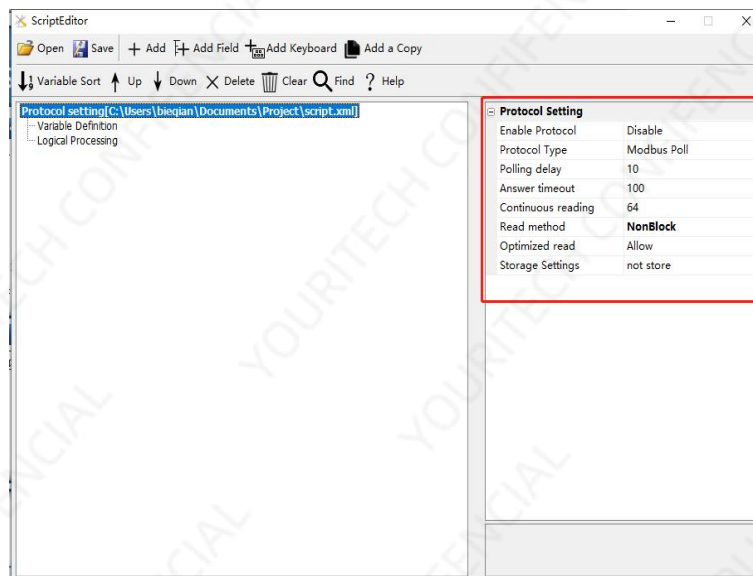


Figure 6-2 Protocol configuration interface



7. LUA Script Configuration

The serial port screens of F-type, M-type and IoT series launched by YOURITECH 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.

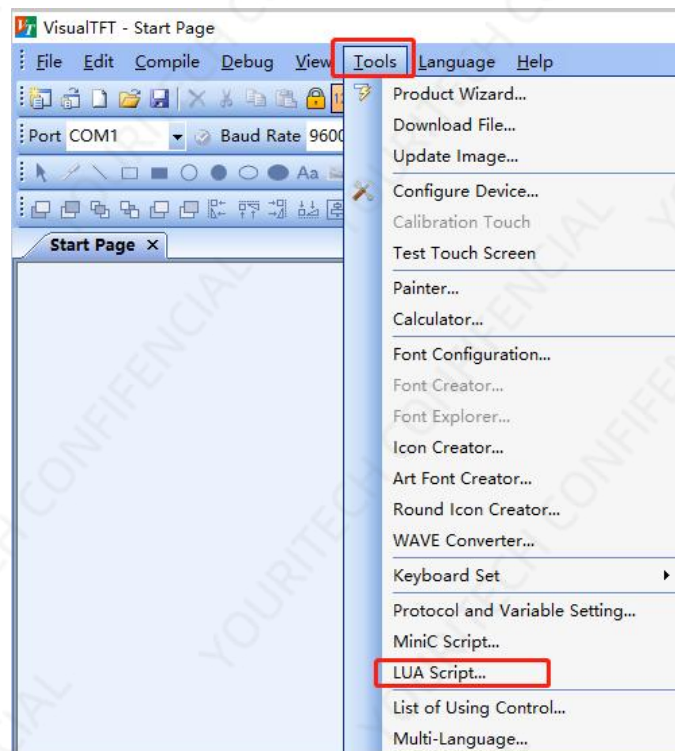


Figure 7 -1 LUA script programming



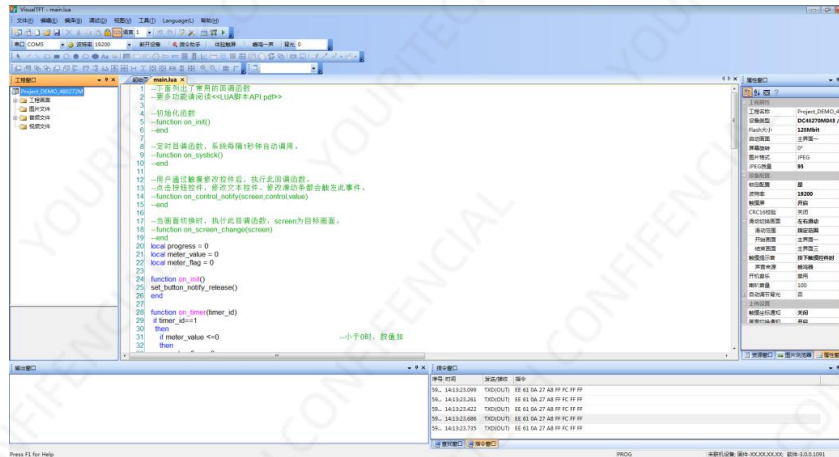


Figure 7-2 Lua scripting interface



8. Packaging and Physical Dimensions

Unit weight					
Net weight(KG)	0.14				
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 2	478*340*275	1	25	25	5.03
Large box	616*478*275	1	50	50	9.75

Note: Total weight does not include accessory weight



9. Product Architecture

The industrial serial port screen launched by YOURITECH is a serial display terminal integrating TFT display driver, picture font storage, GUI operation, RTC, audio and video, WIFI 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 IoT serial screen processor adopts a 32-bit dual-core high-speed processor with a main frequency of 800MHz, which integrates DDR memory, video H264 decoding, audio MP3 decoding, JPEG picture decoding and other functions, and the system architecture is shown in Figure 9-1.

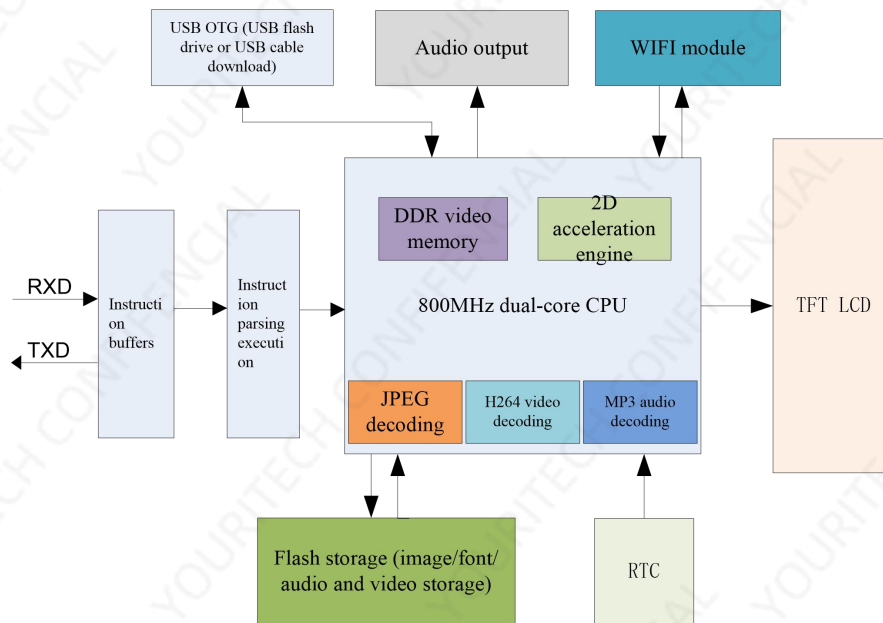


Figure 9-1 Internal structure diagram of IoT serial port screen

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

1. Dedicated 32-bit high-speed processor optimized for picture display, with 2D acceleration engine, JPEG picture hardware decoding, H.264 video hardware decoding, MP3 audio hardware decoding, so that the display can cooperate with various special effects, and the display effect is smooth and gorgeous.
2. Embedded embedded real-time 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 a Virtual TFT Simulation

"Virtual TFT simulation" is the first domestic exclusive serial port screen emulator developed by YOURITECH. 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 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"

11.2 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.

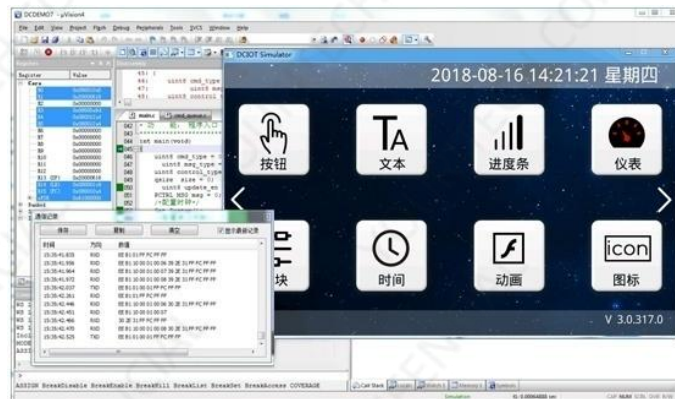


Figure 10-3 The Keil development environment is bound to the virtual serial port screen for debugging



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.



13. Disclaimer

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