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**Product
Datasheet**

Medical Grade ET070KDH6010-DC Data Sheet V1.0

ISO9001:2015 Quality System Certification

Customer			
Keyword	Medical grade, HMI, 600*1024, 7.0 inches, RS485, with configuration, LUA script, video, 2.5D three-dimensional cover, integrated black surface, full lamination IPS screen, WIFI		
Model	ET070KDH6010-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. Introduction to The Appearance of The Product

This product uses a brand new shell, and there are 5 major changes compared to the old shell:

1. The surface glass cover plate uses a 2.5D three-dimensional structure
2. The LCD cover adopts an integrated black design, and the LCD screen and the touchpad are fully laminated structure
3. The upper and lower sides are designed with narrow bezels
4. The overall thickness of the shell is reduced
5. It is installed without a screw lock, and a backplate buckle is used to make installation more convenient

1.1 Shell display diagram

1. The following is a reference diagram of the new enclosure, as shown in Figure 1-1



Figure 1-1 Illustration of the shell

2. The following is a reference of the front view and back view of this size, as shown in Figure 1-2.

Note: It does not involve the modification of key structural processes or major adjustments in layout, only the changes and iterations of product processes or reliability, and the company will not initiate changes externally, which is subject to the physical objects received.



Figure 1-2 Product Reference Diagram



2. Introduction of Hardware

This chapter mainly introduces some appearance reference diagrams, hardware configuration diagrams and debugging tools diagrams.

2.1 Hardware configuration

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

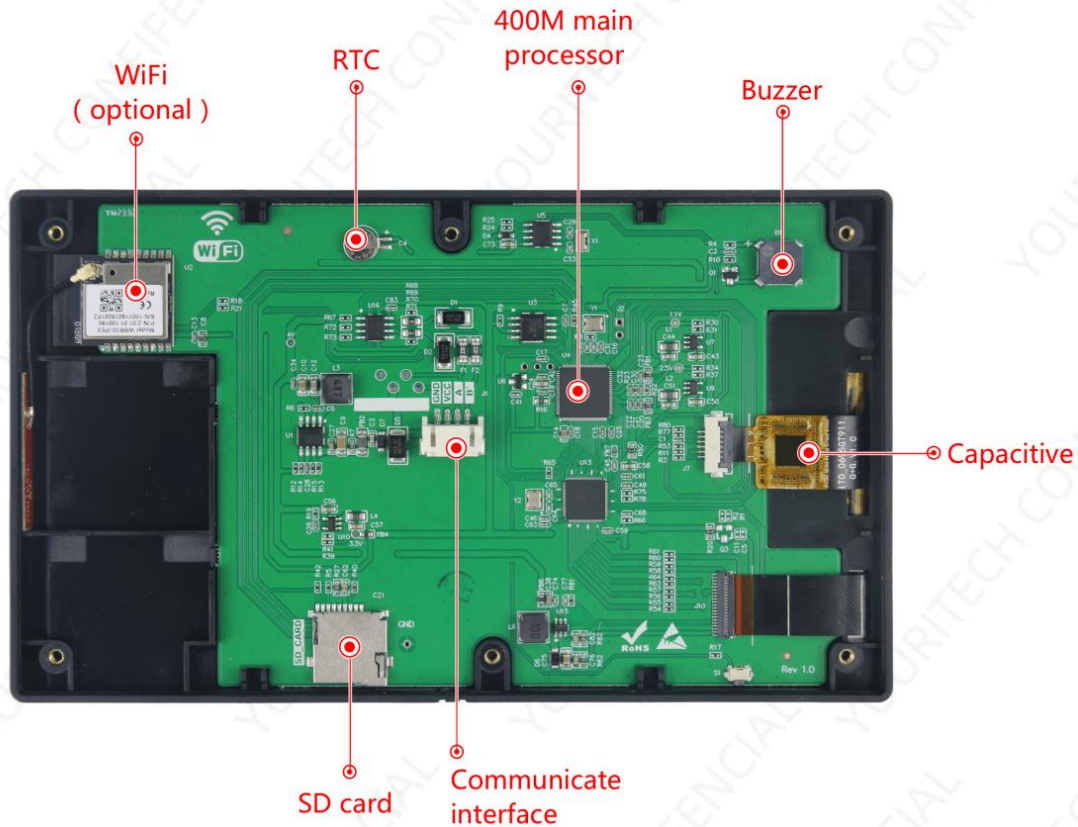


Figure 2-1 Hardware configuration



2.2 Debugging tool

The following is a reference diagram of the debugging tool for this product, illustrated by a resistive screen, as shown in Figure 2-2

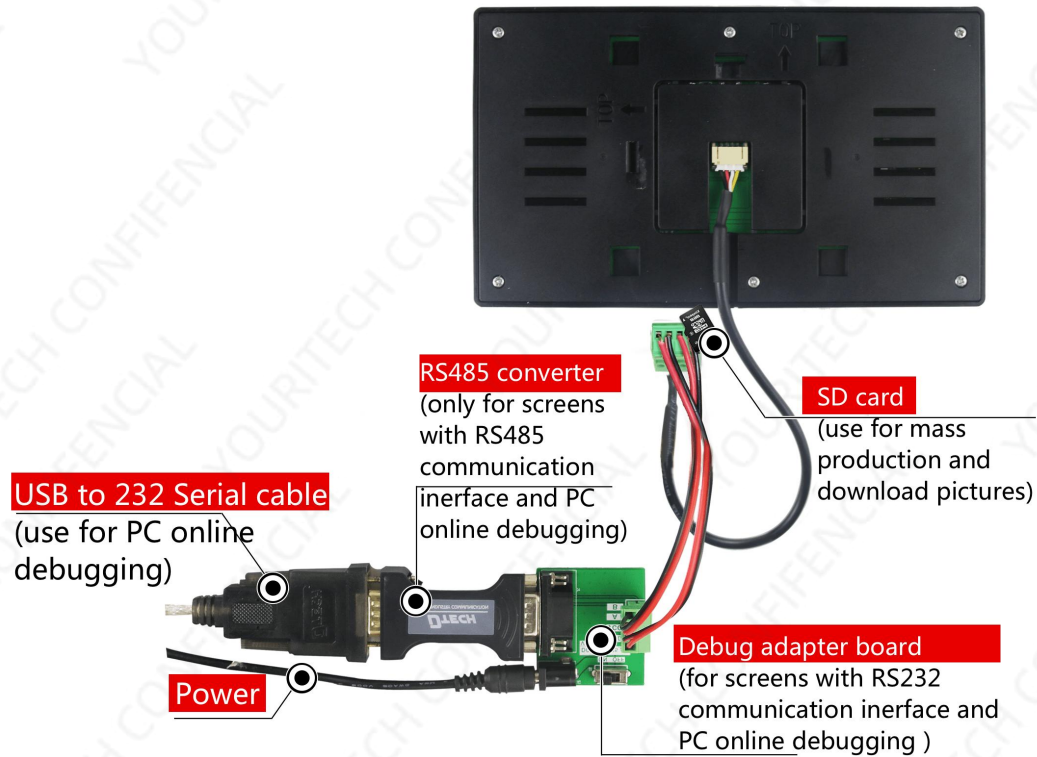


Figure 2-2 Debugging tool

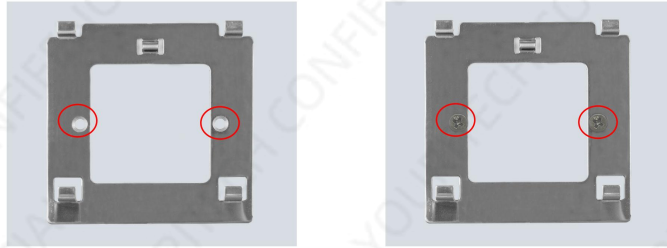
◆ Development of commissioning accessories (optional)	
Name	Accessory Model
Power adapter	Power adapter, 5V 2A DC5.5*2.1mm Tite
USB to 232 serial cable	Titir USB to RS232 serial cable
SD card (with card reader)	Capacity up to 32G (Kingston, SanDisk)
RS485 debug module	232-485 converter (adaptation and selection for RS485 communication products)
Debug board	DC_485_4P debugboard



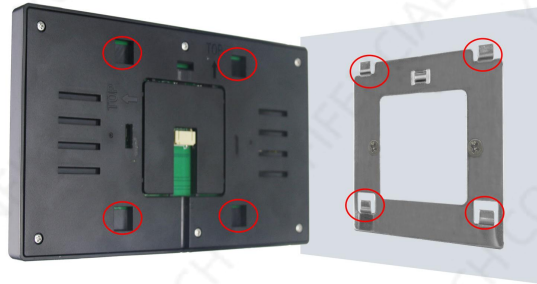
3. Installation Diagram

The following is a schematic diagram of the installation of this model, as shown in Figure 3-1.

HMI人机界面7寸线控器安装示意图
(INSTALLATION DIAGRAM OF HMI-SERIES 7-INCH WIRE CONTROLLER)



第一步：把螺丝放进如图红色标识位置并拧紧螺丝，将挂墙板固定在底壳或者机柜上
(STEP 1: PLACE THE SCREWS IN THE RED MARKED POSITION AS SHOWN IN THE FIGURE AND TIGHTEN THEM TO SECURE THE WALL PANEL TO THE BOTTOM SHELL OR CABINET)



第二步：将串口屏后盖4个扣孔对准底板上的卡扣合上
(STEP 2: ALIGN THE FOUR BUCKLE HOLES ON THE BACK COVER OF THE SERIAL PORT SCREEN WITH THE BUCKLES ON THE BOTTOM PLATE AND CLOSE THEM)



第三步：压合后往上推，确保4个卡扣完全对准
(STEP 3: AFTER PRESSING, PUSH UPWARDS TO ENSURE THAT THE FOUR CLIPS ARE FULLY ALIGNED)



第四步：把串口屏向下推使串口屏扣紧在卡扣上
(STEP 4: PUSH THE SERIAL PORT SCREEN DOWN TO SECURE IT ONTO THE BUCKLE)

Figure 3-1 Installation diagram



4. Protocols and Controls

4.1 Communication protocol

VisualHMI is YOURITECH for human-machine interface application tailored configuration development platform, it adopts variable-driven design, UI display and control logic can be completely separated, and integrates DCBUS, XGUS, Modbus (master/slave) and FX2N (standard/extended), FX3U, Delta, Xinjie and other mainstream PLC protocols in the market, the specific protocol is shown in Figure 4-1;

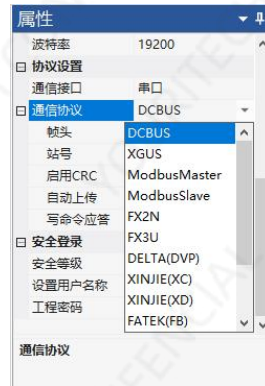


Diagram 4-1 PLC Protocol

4.2 Configuration Controls

Compared with most serial port screens on the market, in addition to the traditional button, text, progress bar control, VisualHMI also adds a variety of new configuration controls, such as: multi-status indicators, formulas, operation records, flow blocks, alarm bars and other configuration controls, which can meet more application scenarios for users, as shown in Figure 4-2;



Diagram 4-2 Configuration Controls



5. Product Specification

◆ Product Specification	
Model Description	ET070KDH6010-DC
Product Series	Medical-grade HMI human-machine interface
Core Processor	400M SOC processor
Operating System	No operating system, can run once power on
Protocol Type	Supporting MODBUS RTU、FX2N、FX3U、DELTA(DVP)、XINJIE(XC)、XINJIE(XD)、FATEK (FB)、HAIWELL (N/S)、SAMKOON、EMERSON、DCBUS、XGUS、SIEMENS(PPI) etc. Protocol
Script language	Version 5.3 LUA scripts with user-written logic, protocols and algorithm functions running inside the screen
Size	7.0 inch
Resolution	600*1024
Installation Orientation	Supports 0, 90, 180 and 270 angle 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 115 full-screen images (calculated by size 120KB/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	4.5-30V
Power Consumption	Darkest backlight: 0.5W
	Brightest backlight: 2.5W
	Brightest backlight+WIFI: 2.5W
Communicate Interface	RS485
Communicate Baud-rate	1200~115200bps, typical baud rate: 9600bps
Communication Connector Specifications	PH2.0-4P
Image Download	SD card, serial port
Firmware local/remote upgrade	Insert SD card/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 = 152.4mm*89.3mm
Product Size (L*W*H)	174.4mm*101.1mm*13.4mm (MAX)



Supporting Host Computer Software	VisualHMI®
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
WIFI	It adopts the WBR1D module, has a built-in 32-bit CPU, supports 802.11a/ b/g/n 1x1, 2.4G&5G frequency bands, and can be configured with a Tuya cloud server, which can be remotely controlled by the Tuya APP.
Three-Conformal Paint Process	None (Optional)

◆ Reliability Parameters

Operating temperature	-20~+70°C
Storage temperature	-30~+80°C
ESD Test	IEC 61000-4-2 Air: ±16KV(无重启)
EFT Test	IEC 61000-4-4 国标 4(电压: ±4KV; 频率: 5KHZ; 时间: 120S), 无重启, 无显示异常, 无触摸异常等现象, 测试功能正常
Radiation Test	EN55022 ClassB

◆ 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	In addition to traditional buttons, text, progress bars, QR codes and other controls, a variety of new configuration controls have been added, such as: multi-status indicators, recipes, operation records, flow blocks, alarm bars and other configuration controls
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 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



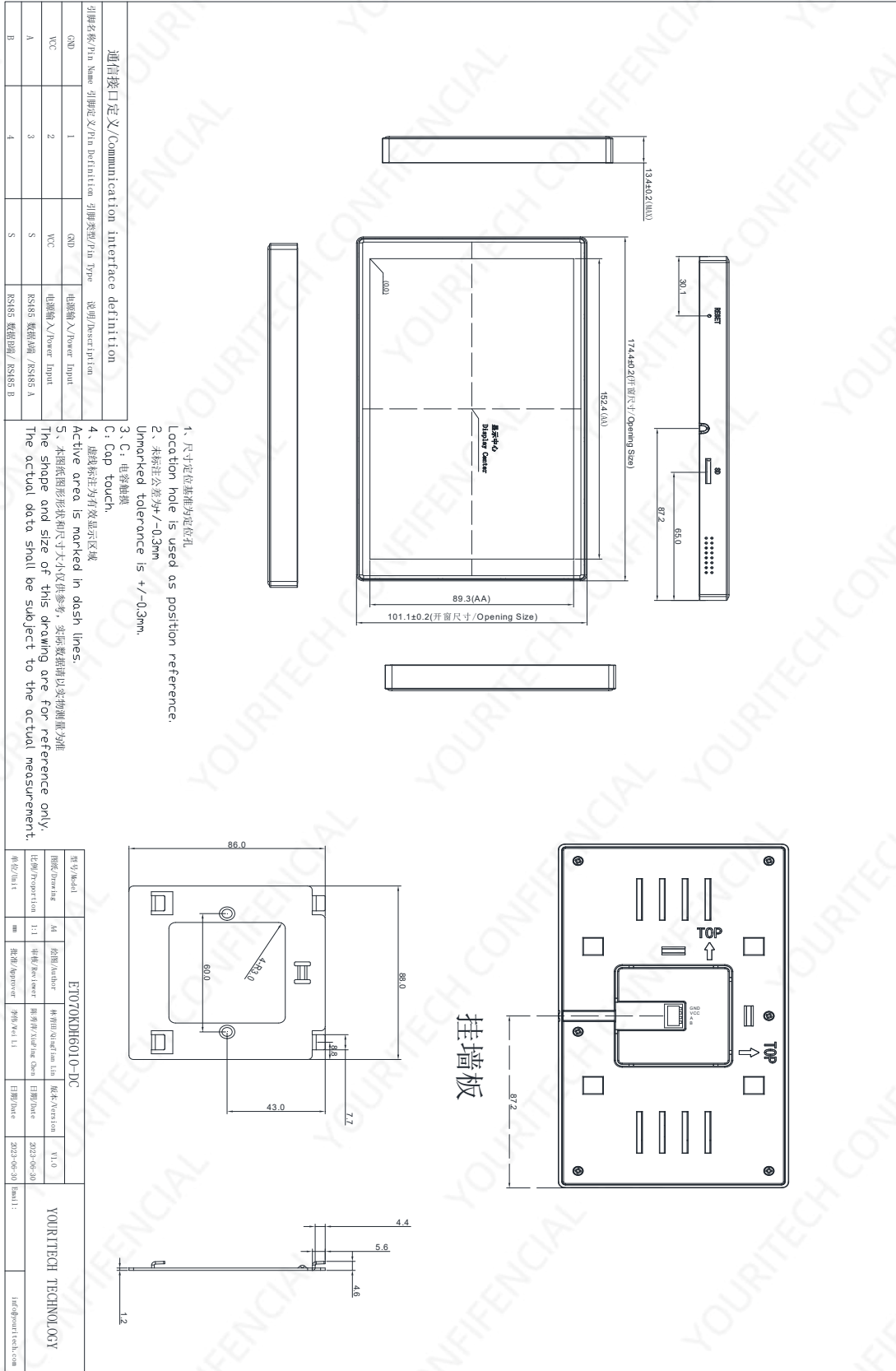
◆ LCD	
Display Type	IPS LCD
Backlight Tube	LED
Brightness (cd/m ²)	300
Backlight Life (h)	>20,000
Contrast Ratio	800:1
Visual Angle (L/R/T/B)	85/85/85/85

◆ Touch panel (capacitance)	
Touch type	Capacitive touch screen
Capacitive screen touch mode	Single-point, swipe touch
Capacitive screen light transmittance	More than 90%
The number of capacitive screen touches	The number of capacitive screen touches is theoretically unlimited, and the touch life is related to the working environment (dust, humidity)
Capacitor cover is customized	The "glass cover + capacitive touch" integrated lamination service can be customized according to the user's drawing size

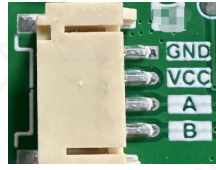
◆ Customization Service	
Customization Fee	One-time order 1000PCS can partial exempt customized fee
Hardware Circuit	Can customize PCB size, circuit thickness, add user circuit, military-grade temperature display, etc.
Software Customization	Customize special instructions or controls according to user needs to reduce user development difficulty
UI design Service	Can provide picture art and product structure design services
Others	Customized on demand to meet all user needs



6. Product Dimensions



Pin Definition

Number	Definition	Description	Reference diagram
1	GND	Power ground	
2	VCC	Power input 4.5-30V	
3	A	RS485 A-side	
4	B	RS485 B-side	



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 Executive Standard

Executive Standard

IEC 61000-4-2

7.1.2 Test Ambient

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 7-2. Observe whether if the screen have reset or restarted,or abnormal display.



Figure 7-2 ESD Test

7.1.3 Test Data

Product Model	Discharge type	Humidity	Test result
HMI60102KM070_1011_4C HMI60102KM070_W011_4C	air	±16KV	No restart, no abnormal display, normal function
<i>Note: The current test 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>			



7.2 High and Low Temperature Aging Test

7.2.1 Test environment

Test ambient temperature: $-20\sim+70^{\circ}\text{C}$

Test ambient humidity: $60\%\pm 3\%\text{RH}$

Test process: the product is placed obliquely in the high and low temperature test box as shown in Figure 7-3, through the 72H high temperature, low temperature, high and low temperature alternating transformation aging test, observe whether the screen during the test and after the experimental test whether the screen has reset and restart, display abnormality, abnormal function and other phenomena.



Figure 7-3 High and low temperature aging test

7.2.2 Test data

Product Model	Temperature	Humidity	Test results
ET070KDH6010-DC	High temperature (70°C)	60%	No restart, no abnormal display, normal function
	Low temperature (-20°C)	60%	No restart, no abnormal display, normal function
	Alternating high and low temperature ($-20\sim 70^{\circ}\text{C}$)	60%	No restart, no abnormal display, normal function



7.3 Group Pulse Test

7.3.1 Executive Standard

Executive Standard	IEC 61000-4-4
--------------------	---------------

7.3.2 Test environment

Test ambient temperature: 25°C

Test ambient humidity: 50%

Test process: the product is placed flat on the test bench, and the power supply after coupling the pulse group generator is used to power the screen, as shown in Figure 7-4, and observe whether the screen is reset and restarted, display abnormal, touch abnormality and other phenomena during the experiment.



Figure 7-4 group pulse test diagram

7.3.3 Test Data

Product Model	Test Standard			Test Result
ET070KDH6010-DC	International 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.

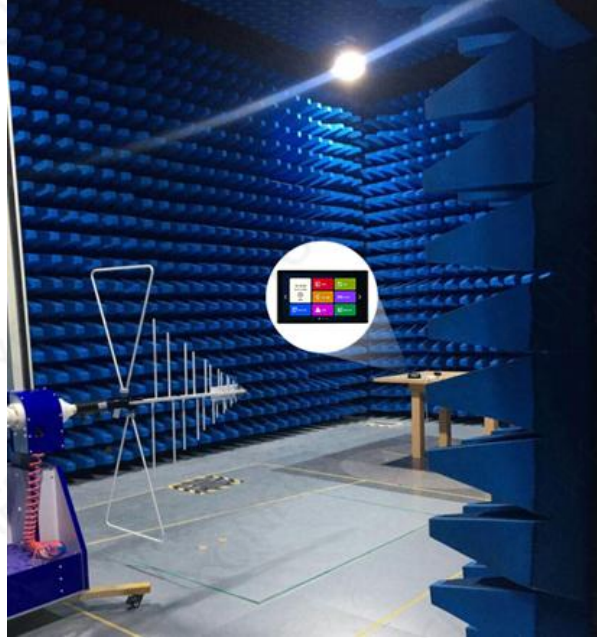


Figure 7-5 Radiation test chart

7.4.3 Test Data

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

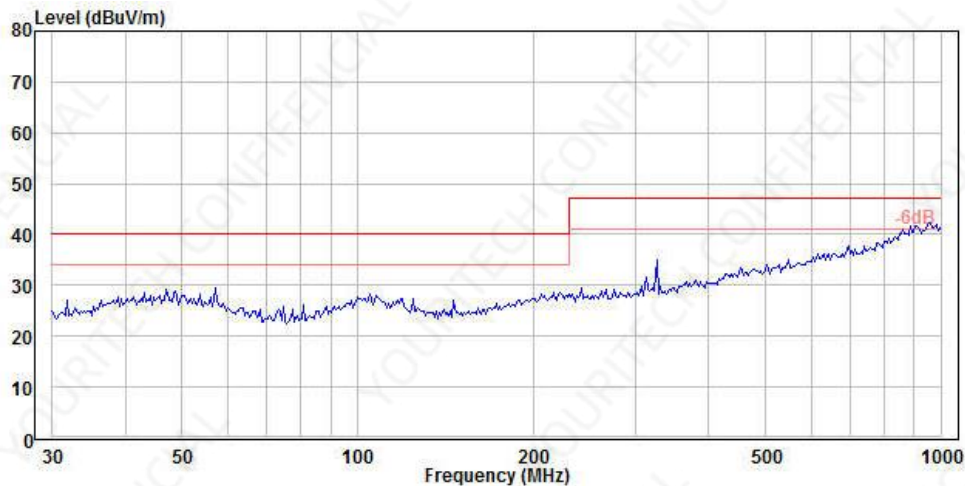


Figure 7-6: Horizontal direction of the radiation test



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

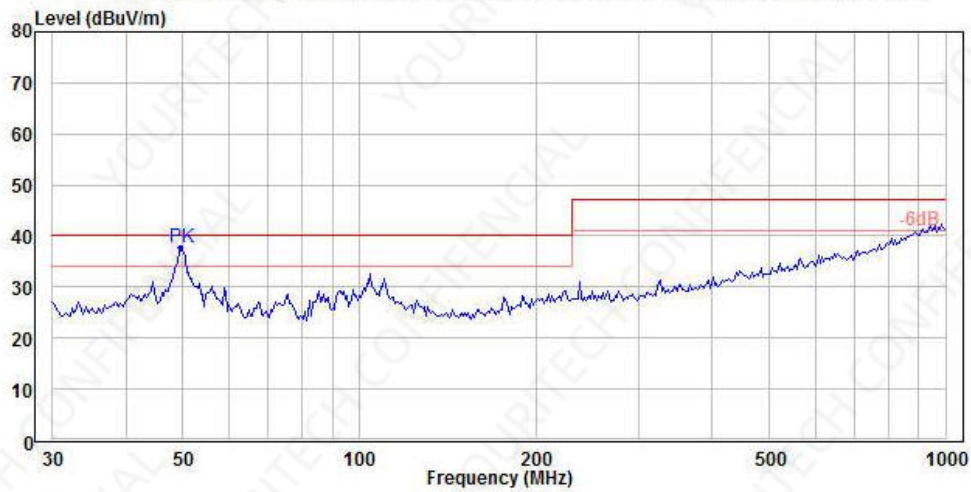


Figure 7-7: Radiation test vertical



8. Protocol Configuration

Users can run MODBUS RTU, XGUS, PLC protocols and other protocols through the host computer configuration.

Open VisualHMI upper computer software, click [Project Settings] → [Communication Protocol] in the menu bar to enter the protocol configuration interface, users can choose to enable the corresponding protocols according to their needs, as shown in Figure 8-1.

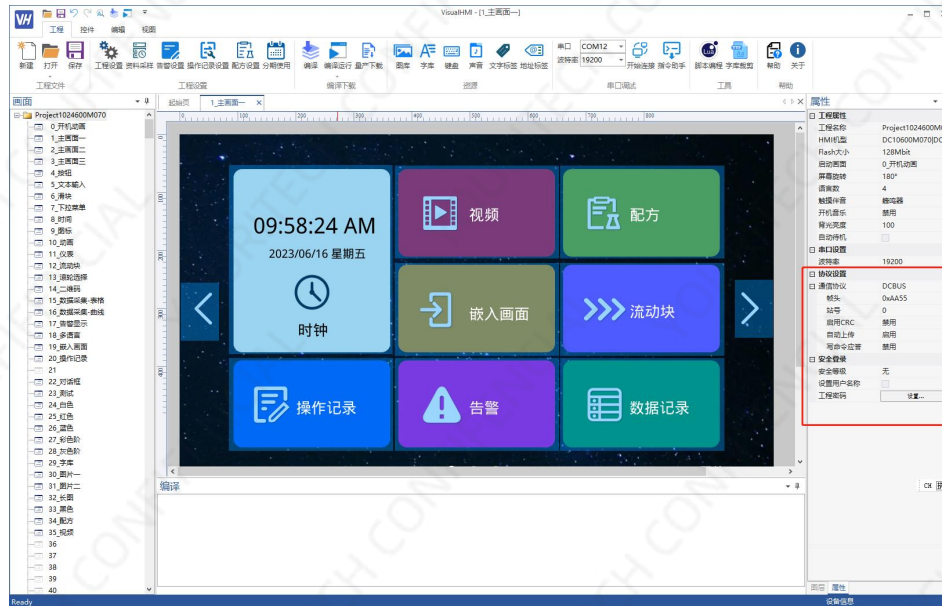


Figure 8 - 1 Protocol Configuration



9. LUA Script Configuration

Guangzhou Dachai Optoelectronics Technology Co. launched serial screen series and HMI series which support LUA language scripting. The serial screen provides rich LUA script API and callback interface, users can directly set and get the running status of all configuration controls by calling the API interface, combined with the written logic processing, the screen can complete the scheduled actions without the participation of external MCU, reducing the data communication between MCU and screen.

LUA is a lightweight scripting language with simpler syntax and logic than C. LUA comes with a library of well-functioning mathematical functions, string processing, JSON and other libraries, which support common mathematical operations, such as opening square, sine and cosine, taking absolute values, etc.; due to the high main frequency of the screen itself, all complex algorithms are handled by the screen, which greatly reduces the user's MCU execution overhead.

The LUA script for writing projects in VisualHMI software can be opened by clicking the menubar [Project] → [LUA Programming], as shown in Figure 9 -1, to enter the LUA script writing interface as shown in Figure 9-2.

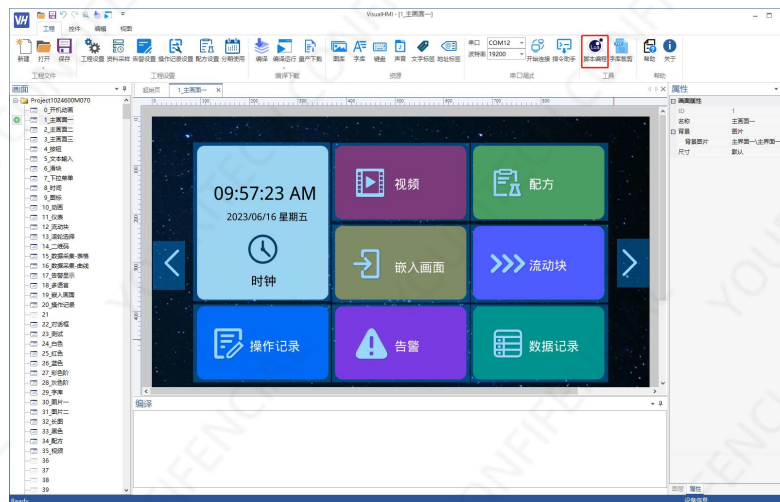


Figure 9 -1 LUA script programming



```

SourceEditor - [main.lua]
File Edit Tools View Window Help
main.lua
1 1|ESC_KEY = 0 -- 数据地址
2
3 -- 数据类型定义
4 VT_LW = 1 -- 变量地址
5 VT_SW = 2 -- FLASH存储
6
7
8 local useraddr = {} -- 用户地址, 对应工程设置的地址表
9
10 driver = 0x0003, -- 设备名称
11 temp_warn = 0x0100, -- 温度
12 temp_value = 0x0100, -- 温度
13 time_set = 0x010B, -- 时间设置
14 master_addr = 0x010C, -- 设备地址
15 textback_addr = 0x010D, -- 文本背景色
16 channel_name = 0x010E, -- 通道名称
17 channel_addr = 0x010F, -- 通道地址
18 channel_name = 0x0110, -- 通道名称
19 channel_name = 0x0111, -- 通道名称
20 music_volume = 0x0112, -- 音量
21 music_volume = 0x0113, -- 音量
22 music_volume = 0x0114, -- 音量
23 music_volume = 0x0115, -- 音量
24 music_volume = 0x0116, -- 音量
25 music_volume = 0x0117, -- 音量
26 music_volume = 0x0118, -- 音量
27 music_volume = 0x0119, -- 音量
28 music_volume = 0x011A, -- 音量
29 music_volume = 0x011B, -- 音量
30
31 local sysaddr = {} -- 系统参数地址, 对应工程系统地址表
32 screen_id = 0x0100, -- 屏幕ID
33 music_volume = 0x0101, -- 音量
34 music_volume = 0x0102, -- 音量
35 music_volume = 0x0103, -- 音量
36 music_volume = 0x0104, -- 音量
37 music_volume = 0x0105, -- 音量
38 music_volume = 0x0106, -- 音量
39 music_volume = 0x0107, -- 音量
40 music_volume = 0x0108, -- 音量
41 music_volume = 0x0109, -- 音量
42 music_volume = 0x010A, -- 音量
43 music_volume = 0x010B, -- 音量
44 music_volume = 0x010C, -- 音量
45 music_volume = 0x010D, -- 音量
46 music_volume = 0x010E, -- 音量
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10. Packaging With Physical Dimensions

Unit weight					
Net weight (KG)	0.29				
Packing standards and total weight					
Box model	Box size (length * width * height in mm)	Number of layers	Quantity (PCS)/layer	Total Quantity (Pieces)	Total weight (KG)
Box 2	616*478*275	1	50	50	14.5

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



11. Product Structure

The industrial serial port screen launched by YOURITECH Technology is a serial display terminal that integrates TFT display driver, picture storage, GUI operation, audio playback and various configuration controls. The user MCU only needs to send and receive the corresponding serial port commands to easily display text, pictures and curves.

The M series serial port screen processor uses a 32-bit 400M SOC processor, which integrates functions such as SDR memory and JPEG image decoding. The system structure is shown in Figure 11-1

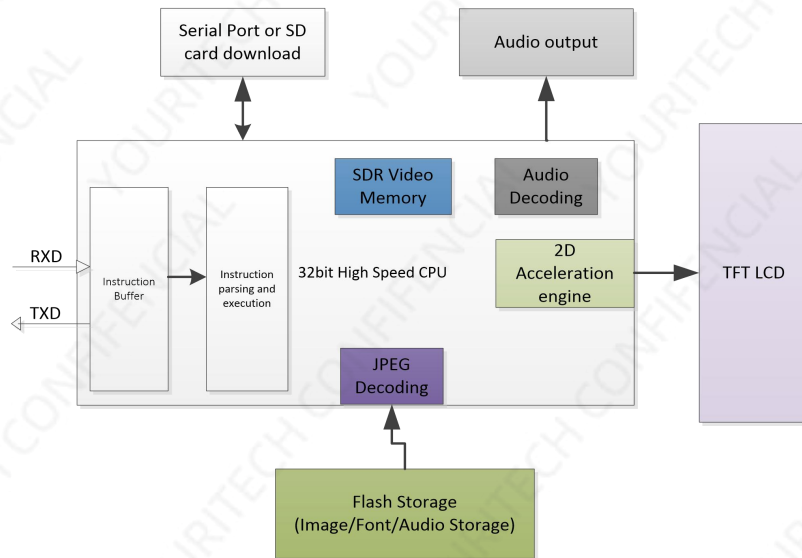


Figure 11-1 HMI hardware structure reference diagram

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

1. Dedicated 32-bit 400M SOC processor optimized for picture display, with 2D acceleration engine, JPEG picture hardware decoding, so that the display can cooperate with various special effects, and the display effect is smooth and gorgeous.
2. No operating system, 24 * 365h hours of continuous power can work reliably, no garbage redundant files.



12. Development Software

VVisualHMI is a serial port screen development and debugging software independently developed by YOURITECH. It integrates the first exclusive "virtual serial port screen" simulation emulator in China, is free for life. After the user creates a new project, import the designed UI picture, and then configure the buttons and other controls in each screen. After the simulation is correct, finally download the entire project to the serial port screen. The software interface is shown in Figure 12-1.

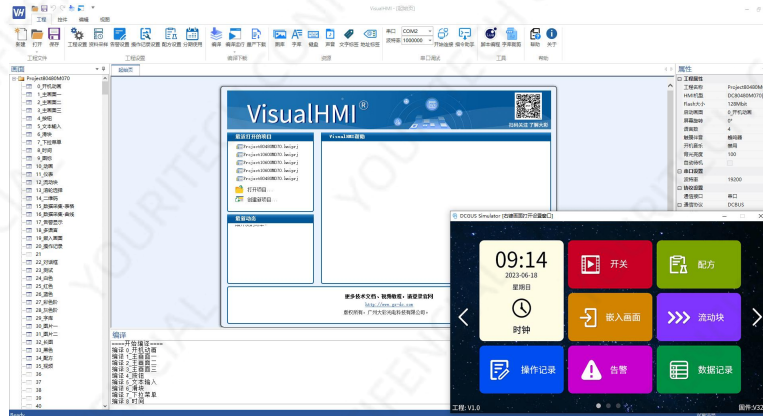


Figure 12-1 VisualHMI Main interface

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

1. Prepare art design materials

Arrange UI designers to design the images required for products such as start-up image, text background, button icon and prompt box.

2. Conduct image editing, scripting, control configuration and image downloading with VisualHM software

First of all, using the supporting host computer VisualHM software, then typeset interface and configure controls of the pre-designed artwork pictures, run the "virtual serial port screen" for simulation, and finally the entire project can be completed download through SD / UART (depending on the hardware configuration of different models) to the internal memory of the serial port screen. The PC software will assign 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. User's single-chip micro computer monitors and sends the corresponding serial port instructions to control the image display

After the project is downloaded to the screen, once a button is pressed on the screen, the user MCU serial port will receive the button information uploaded on the screen. By judging the value of the variable according to the binding address, the user can obtain the current button's screen position and functional attributes, so that it can control the relevant peripheral device action or screen update display.



12.1 What is visual serial interface screen

The "Screen Preview" is an HMI emulator developed by Guangzhou Dachai Optoelectronics Technology Co. Users can run it after installing the upper computer VisualHMI software. The virtual HMI simulation result is exactly the same as the real HMI. Therefore, there is no need to purchase hardware during the pre-R&D evaluation, and it can communicate with each other by connecting to it through its own microcontroller RS232 serial port, and the mouse click on the button will immediately upload the button control information, as shown in Figure 13-2. Once the developer has passed the debugging, the real hardware does not need to be debugged again.



Figure 12-2 Online debugging of the serial port of the user's single-chip microcomputer and the "virtual HMI"

12.2 Keil and virtual HMI binding debugging

In order to further improve development efficiency, users can also bind Debug to the "virtual HMI" through the Keil development environment. When the program is single-step debugging, all running results can be presented on the "virtual HMI", which greatly saves the engineer's development time, as shown in Figure 12-3. Once the engineering interface is changed, the user no longer needs to re-download the image to the HMI, and all pre-project evaluation can be done on the PC.

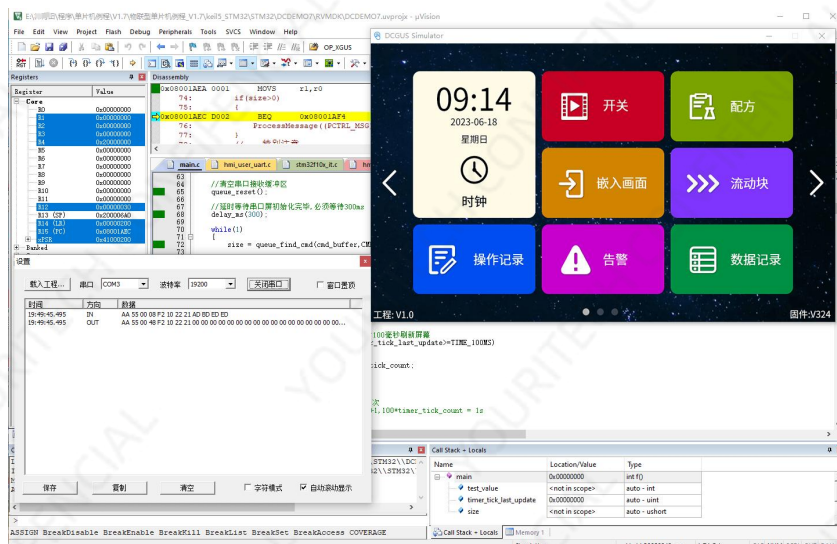


Figure 12-3: The Keil development environment is bound to debug with the virtual HMI



Note: The debugging of virtual HMI needs keil software support, in the debug process, enter dirvtreg in the command serial port, you need to list SxIN (according to the microcomputer, x may represent 0, 1, 2), if there is a list of means that 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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