

ShenZhen Yes-Display International Technology CO.,LTD. 深圳市亿显国际科技有限公司			3.5 Inch UART Display Module 3.5 寸串口显示屏	
File NO.		REV	A/01	http://www.yes-display.com

UART Display Module

Module: YS-CB-0350LT16M-05 V1.0

Designed by	R&D Checked by	Quality Department by	Approved by

Approval by Customer:

OK

NG, Problem survey

Approved By _____

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版本记录 / Revision Record

REV NO.	REV DATE	Contents Before Change	Contents After Change	Note
V1.0	2022/12/14	NEW		

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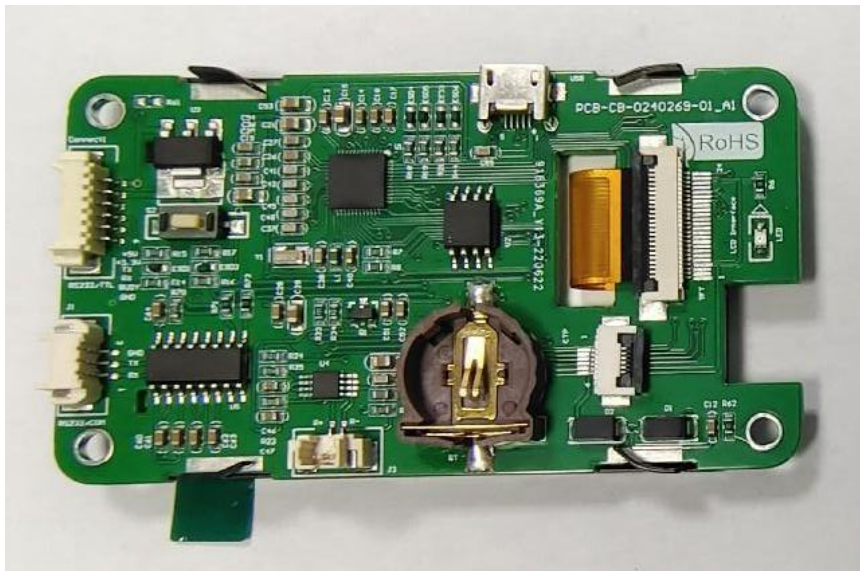
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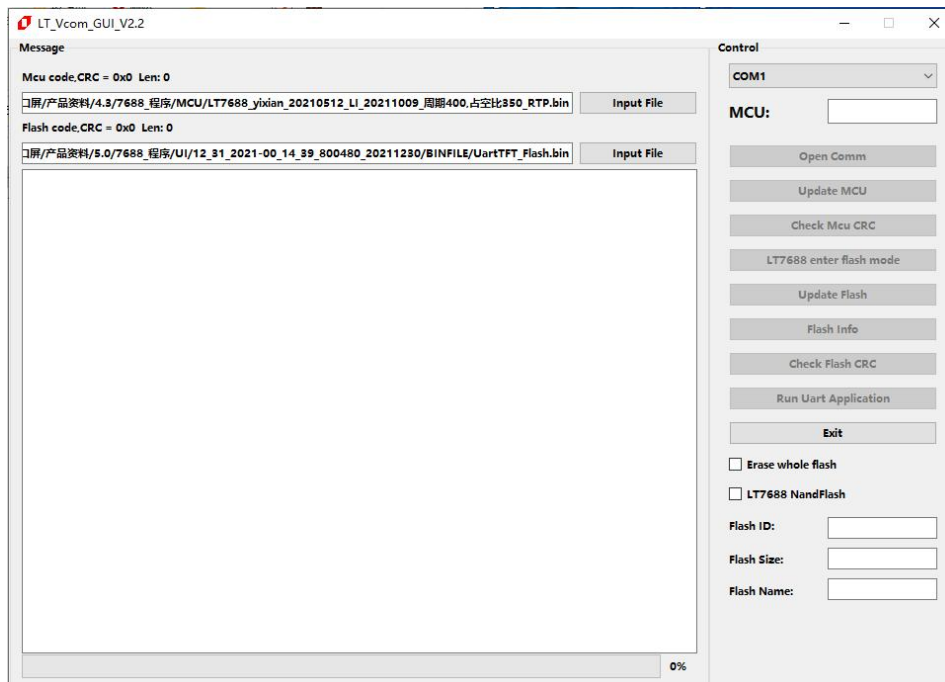
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1. 硬件简介 / Hardware Introduction

1.1 硬件指导 / Hardware Introduction



1.2 调试工具 / Debug Tool



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2. 产品应用图 (中文部分)

2.1 主核芯片介绍

YS-09 是针对小尺寸 MCU 屏所设计的 Uart 串口屏控制芯片。其内部采用 32bit M4 核心架构，主要的功能就是提供 Uart 串口通讯，让主控端 MCU 透过简易的指令就能轻易的将要显示到 TFT 屏的内容传递给小尺寸 MCU 屏上的 TFT 驱动器 (Driver)，YS-09 内部硬件及程序提供图形处理功能，能够提升 TFT 显示效率，及降低主控端 MCU 处理图形显示的时间，YS-09 支持小尺寸 MCU 接口的 TFT 屏，通常是 3.5" 以下、显示分辨率为 480*320 (HVGA) 以内，提供 SPI 或 8 位的 MCU 接口。

YS-09 内部的主频可达 120MHz，含有 508K bytes Flash、256K bytes SRAM，除了提供 Uart 串口通讯，也提供一 SPI Flash 接口，外接的 SPI Flash 可以用来储存图片、动画、字库等信息。YS-09 内的 MCU 程序已经包含了 深圳市亿显国际科技有限公司 的串口协议，可以配合 深圳市亿显国际科技有限公司 开发的 PC 上位机软件 (UI_Editor / UartTFT_Tool)，直接在电脑上进产品的 UI 显示接口开发，除了提升显示效率外，也大幅缩短 TFT 显示功能的开发周期。YS-09 内建串口指令功能包括图片显示、GIF 动画显示、循环图片显示、开机画面显示、进度条显示、文字串显示、二维码产生，及几何图形显示如画线、画圆、画三角形、画矩形等功能。YS-09 内的 MCU 程序除了串口协议外也含有升级程序，可使用 USB 接口及通讯软件，对内部 MCU 程序及 SPI Flash 数据进行更新，也可以透过 SD 卡更新 SPI Flash 内的数据，详细请参考第 1.4 节说明。

YS-09 的显示功能非常适合用在有小尺寸 TFT-LCD 屏的电子产品上，或是原使用单色屏而想进行升级的产品，如各式小家电、智能家电、工业控制板、电子仪器、医疗设备、小型检测设备等产品。下图为 YS-09 的应用方块图：

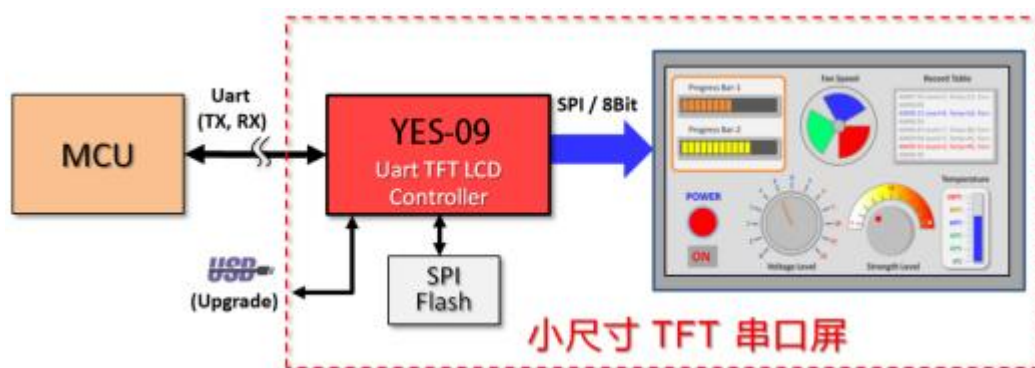


图 1-1: YS-09 应用方块图

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2.1 TFT 串口屏的软硬件架构

所谓的 TFT 串口屏就是在 TFT 显示模块上加上 MCU 及 TFT 控制器，该 MCU 负责接收主控端主板送来的串口 (Uart) 指令，然后依据这些定义好的指令去显示出图片或是动画，主控端主板上的 MCU 不需要为了繁琐的图片显示去编写复杂的程序，因此 TFT 串口屏实际上就是一种指令屏的架构。

TFT 串口屏对主控端主要是透过 RS232 或是 RS485 接口来通讯，如果主控端与 TFT 串口屏的距离很近 (~30cm 内)，可以将主控端 MCU 的 Uart 输出输入口直接接到 YS-09 串口屏上的 Uart 输出输入口，如下图所示示意图：

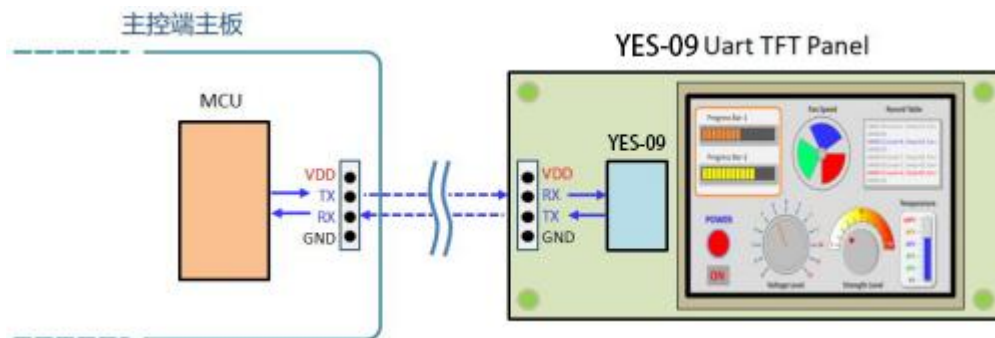


图 1-2: 主控端 MCU 的 Uart 与 YS-09 串口屏的 Uart 连接示意图

如果要达到较远距离的通讯效果，通常需要加上 RS232 或是 RS485 的专用驱动芯片，下图为主控端与 YS-09 串口屏的 RS232 驱动 IC 接口示意图：

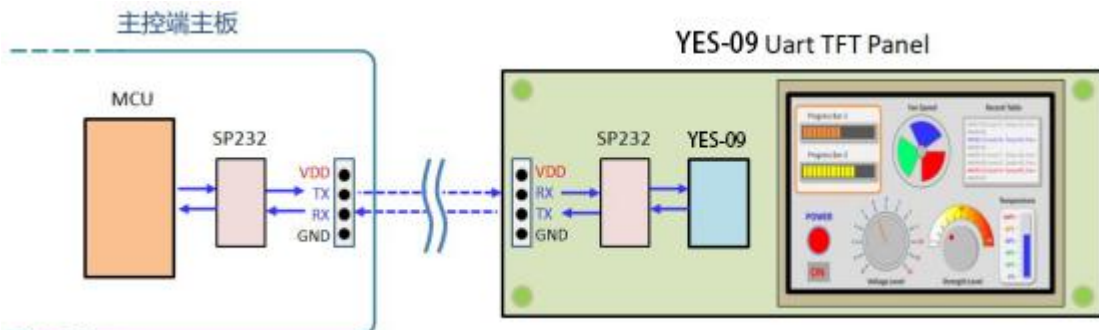


图 1-3: 主控端 MCU 与 RS232 驱动 IC 的接口示意图

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在使用 YS-09 串口屏之前必须要用上位机软件做开发，深圳市亿显国际科技有限公司提供了**图文整合编译器 (UartTFT_Tool.exe)** 及 **图文 UI 编辑器 (UI_Editor.exe)** 两种上位机软件，两者都可以单独对 YS-09 的 TFT 串口屏进行设置及显示功能的开发，上位机软件开发时会将使用到的图片、文字、动画等信息产生 Bin 档，开发者可以透过 USB 及使用 **YS-09_ISP_Vxx.exe** 程序、或是专用的 SPI Flash 烧录器将 Bin 档烧录到 SPI Flash 内，然后透过 USB 转 Uart (RS232)的控制线对 TFT 串口屏进行模拟，也就是做 TFT 屏显示画面的前期验证。

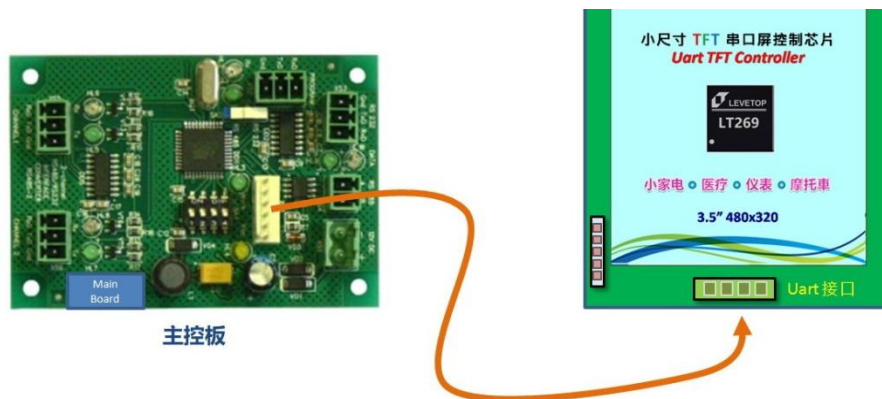


图 1-5：主控端主控板与 TFT 串口屏连接

图文整合编译器 (UartTFT_Tool.exe) 对每个 TFT 串口屏的显示动作都有一个固定的指令，例如 80h 就是显示图片的指令，UartTFT_Tool 会将使用的图片给予编号，在进行编译后将所有图片、文字、动画等信息产生 Bin 档，开发者将 Bin 档烧录到 SPI Flash 内后，于验证的时候当电脑送出 80h、00h 那么 TFT 串口屏就会显示第一张图片，送出 80h、01h 就会显示第二张图片，当 UartTFT_Tool 发出的指令格式都能在 TFT 屏上显示及达到开发者所要的效果，就可以实地将主控端连接到 TFT 串口屏 (如上图 1-5)，而主控端 MCU 程序送出 0xAA(Start) 、 80h、 00h、 1Bh(CRC1)、 98h(CRC2) 、 0xE4(End1)、 0x1B(End2)、 0x11(End3)、 0xEE(End4) 指令后，TFT 串口屏就会显示第一张图片，同时回传信息 0xAA(Start) 、 80h、 00h、 00h、 1Bh(CRC1)、 98h(CRC2)) 、 0xE4(End1)、 0x1B(End2)、 0x11(End3)、 0xEE(End4) 给主控端，确认整个指令握手协议完成，如下图：

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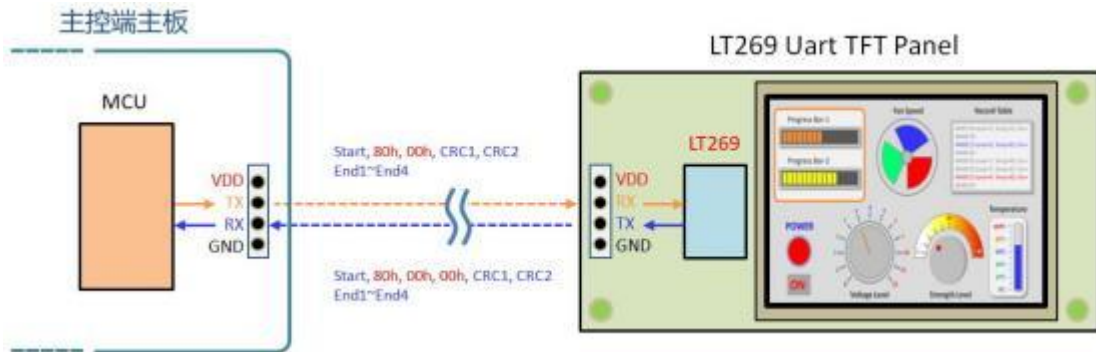


图 1-6：串口屏的指令协议范例一

当主控端 MCU 程序送出 0xAA(Start) 、 80h、 01h、 0Bh(CRC1)、 B9h(CRC2) 、 0xE4(End1)、 0x1B(End2) 、 0x11(End3) 、 0xEE(End4) 指令后, TFT 串口屏就会显示第二张图片, 同时回传信息 0xAA(Start) 、 80h、 01h、 00h、 1Bh(CRC1)、 98h(CRC2) 、 0xE4(End1)、 0x1B(End2)、 0x11(End3)、 0xEE(End4) 给主控端, 确认整个握手协议完成, 如下图:

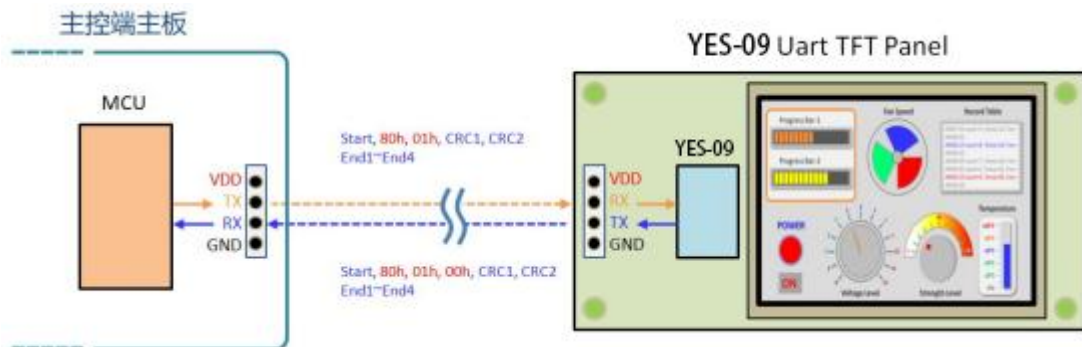


图 1-7：串口屏的指令协议范例二

为了确保主控端与 TFT 串口屏之间的数据传递正确, 主控端 MCU 程序送出的指令还要加上 1 个 Byte 的起始码 (固定为 0xAA)、 2 个 Byte 的 CRC 码、 4 个 Byte 的结束码 (固定为 0x E4、 0x 1B、 0x 11、 0x EE), 而 TFT 串口屏收到信息或是完成指令后会回传后信息给主控端的 MCU。

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2. Product Application Diagram (English part)

2.1 Main core chip introduction

The YS-09 is a Uart serial port screen control chip designed for a small MCU screen. Its internal adopted 32bit M4 core architecture, The main function is to provide Uart serial port communication, Let the master terminal MCU can easily pass the content to be displayed to the TFT screen to the TFT drive (Driver) on the small MCU screen through the simple instructions, The YS-09 internal hardware and programs provide graphics processing functions, Can improve the TFT display efficiency, And reduce the time that the master terminal MCU processes the graphics display, The YS-09 supports the TFT screen with a small-size MCU interface, Usually below 3.5 ", with a display resolution of within 480 * 320 (HVGA), Provides an SPI or 8-bit MCU interface.

The YS-09 has a main frequency of up to 120MHz, which contains 508K bytes Flash and 256K bytes SRAM. In addition to providing Uart serial port communication, it also provides a SPI Flash interface. The external SPI Flash can be used to store pictures, animation, word library and other information. The MCU program in YS-09 has included the serial port protocol of Shenzhen I International Technology Co., LTD., which can cooperate with the PC upper computer software (UI_Editor / UartTFT_Tool) developed by Shenzhen I _ International Technology Co., LTD., to directly develop the product UI display interface on the computer, in addition to improving the display efficiency, but also greatly shorten the development cycle of TFT display function. YS-09 built-in serial port command functions include picture display, GIF animation display, cyclic picture display, boot picture display, progress bar display, display of text string display, QR code generation, and geometric figure display such as drawing line, drawing circle, drawing triangle, drawing rectangle and other functions. In the MCU program, YS-09 also includes the serial port protocol. You can use the USB interface and communication software to update the internal MCU program and SPI Flash data, or update the data in the SPI Flash through the SD card. Please refer to Section 1.4 for details.

The display function of YS-09 is very suitable for electronic products with small TFT-LCD screens, or products that want to upgrade with monochrome screens, such as various small home appliances, smart home appliances, industrial control boards, electronic instruments, medical equipment, small testing equipment and other products. The following diagram shows the application block diagram for YS-09:

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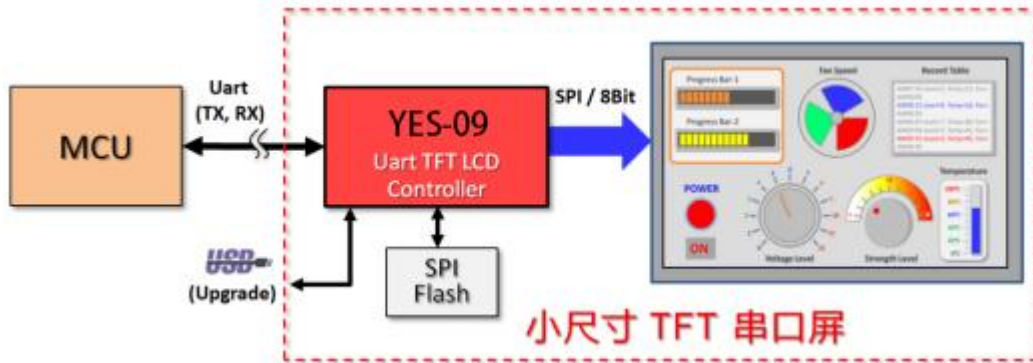


Figure 1-1: YS-09 Application Block Map

2.1 Hardware and software architecture of the TFT serial port screen

The so-called TFT serial port screen is on the TFT display module plus MCU and TFT controller, the MCU is responsible for receiving the master end motherboard sent serial port (Uart) instructions, and then according to these defined instructions to show pictures or animation, master end MCU motherboard does not need to be complicated picture display to write complex programs, so TFT serial port screen is actually a kind of instruction screen architecture.

The TFT serial port screen mainly communicates through the RS232 or RS485 interface. If the main distance between the master control terminal and the TFT serial port screen is very close (within ~30cm), the Uart output input port of the MCU of the master control terminal can be directly connected to the Uart output input port on the YES-09 serial port screen in the schematic diagram below:

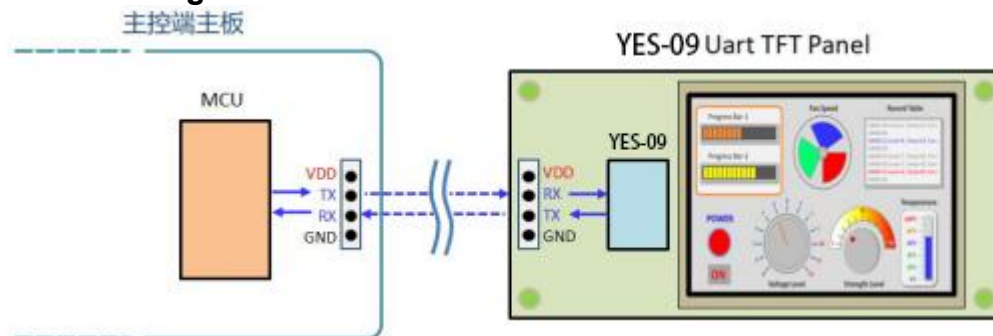


Figure 1-2: Schematic diagram of Uart connection between master terminal MCU and Uart connection of YES-09 serial port screen

If you want to achieve a long-distance communication effect, it is usually necessary to add a special drive chip for RS232 or RS485. The following diagram shows the RS232 drive IC interface between the main control end and the YES-09 serial port screen:

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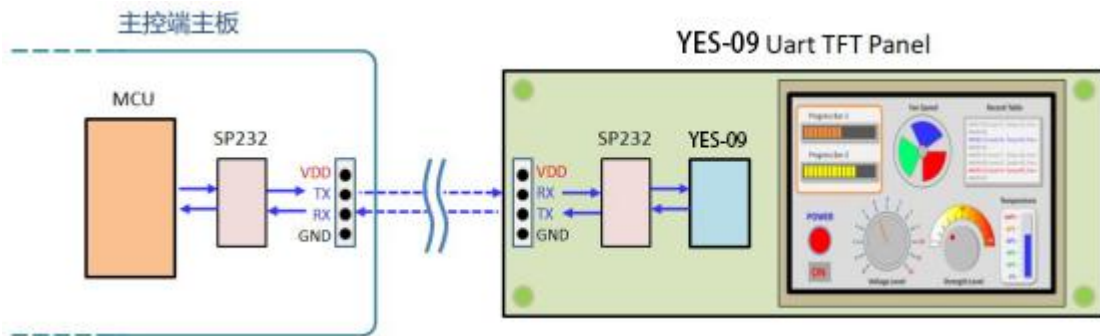


Figure 1-3: Schematic diagram of interface between MCU and RS232 driver IC

Before using the YS-09 serial port screen, Shenzhen Yixian International Technology Co., Ltd. provides the graphic integrated compiler (UartTFT_Tool.exe) and the graphic UI editor (UI_Editor.exe) two upper computer software, Both can set up and display the TFT serial port screen of YS-09 alone, Upper computer software development will use the picture, text, animation and other information generated Bin file, Developers can burn Bin files to the SPI Flash through the USB and using a YS-09_ISP_Vxx.exe program, or a dedicated SPI Flash burner, Then, the TFT serial port screen is simulated through the control line from USB to Uart (RS232), That is, to do the early verification of the TFT screen display screen.

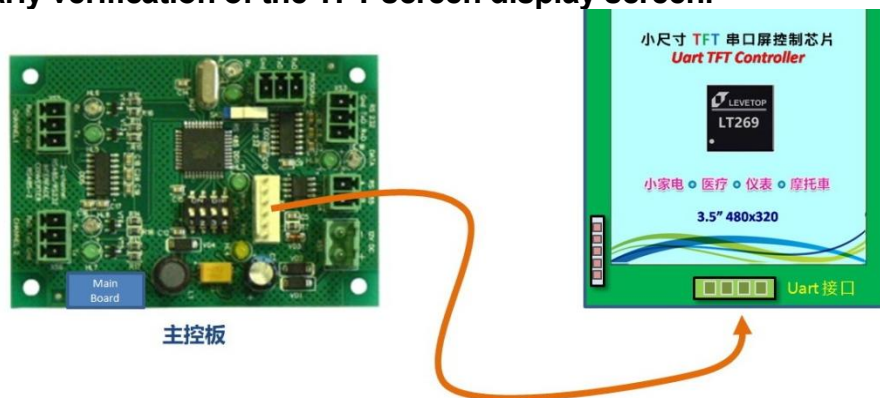


Figure 1-5: Main control board is connected with the TFT serial port screen

The graphic integration compiler (UartTFT_Tool.exe) has a fixed command for each TFT serial port screen display action, For example, 80h is the instruction to display pictures, UartTFT_Tool will number the images used, After compilation, all the pictures, text, animation and other information will be generated in the Bin file, After the developer burned the Bin file to the SPI Flash, In the verification time, when the computer delivers 80h, 00h, then the TFT serial port screen will show the first picture, At 80h, 01h, a second picture appears, When the format of UartTFT_Tool commands can be displayed on the TFT screen and achieve the

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effect that the developers want, The master terminal can be connected to the TFT serial port screen (as figure 1-5 above), After sending out the 0xAA (Start), 80h, 00h, 1Bh (CRC1), 98h (CRC2), 0xE4 (End1), 0x1B (End2), 0x11 (End3), 0xEE (End4) instructions, The TFT serial port screen shows the first picture, Return the information 0xAA (Start), 80h, 00h, 00h, 1Bh (CRC1), 98h (CRC2)), 0xE4 (End1), 0x1B (End2), 0x11 (End3), 0xEE (End4) to the main terminal, Confirm that the entire instruction handshake agreement is complete, as illustrated in following figure:

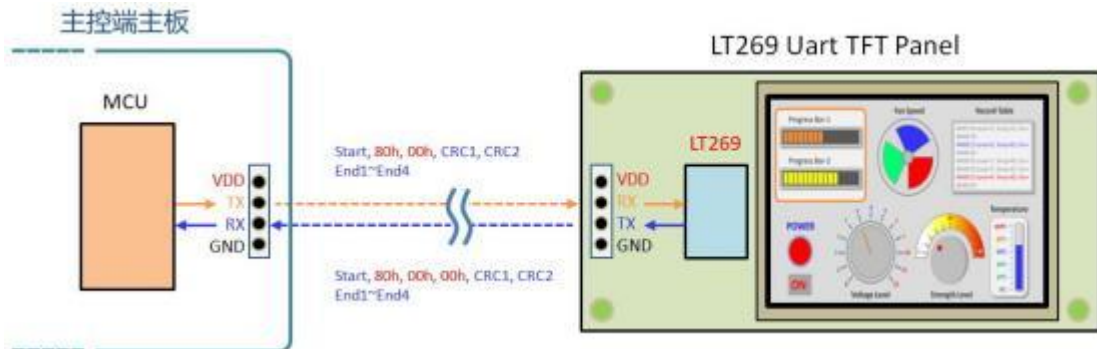


Figure 1-6: Example 1 of the instruction protocol of the serial port screen

When the master terminal MCU program sends commands 0xAA (Start), 80h, 01h, 0Bh (CRC1), B9h (CRC2), 0xE4 (End1), 0x1B (End2), 0x11 (End3), 0xEE (End4), The TFT serial port screen shows the second picture, At the same time, return information 0xAA (Start), 80h, 01h, 00h, 1Bh (CRC1), 98h (CRC2), 0xE4 (End1), 0x1B (End2), 0x11 (End3), 0xEE (End4) to the main terminal, Confirm the entire handshake agreement, as illustrated in following figure:

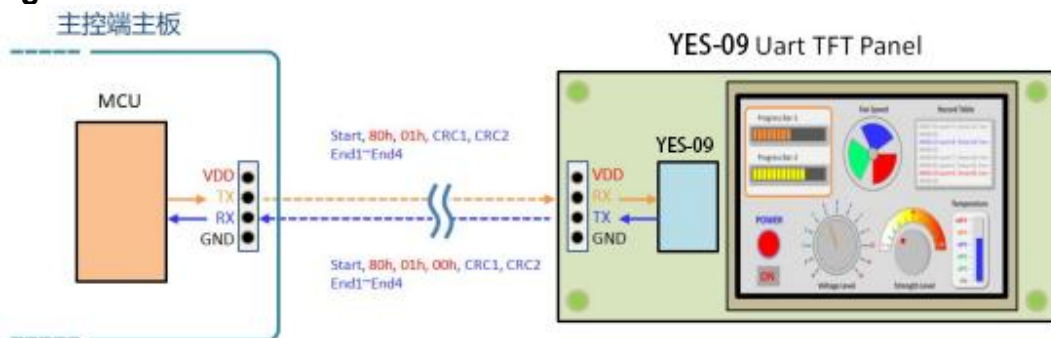
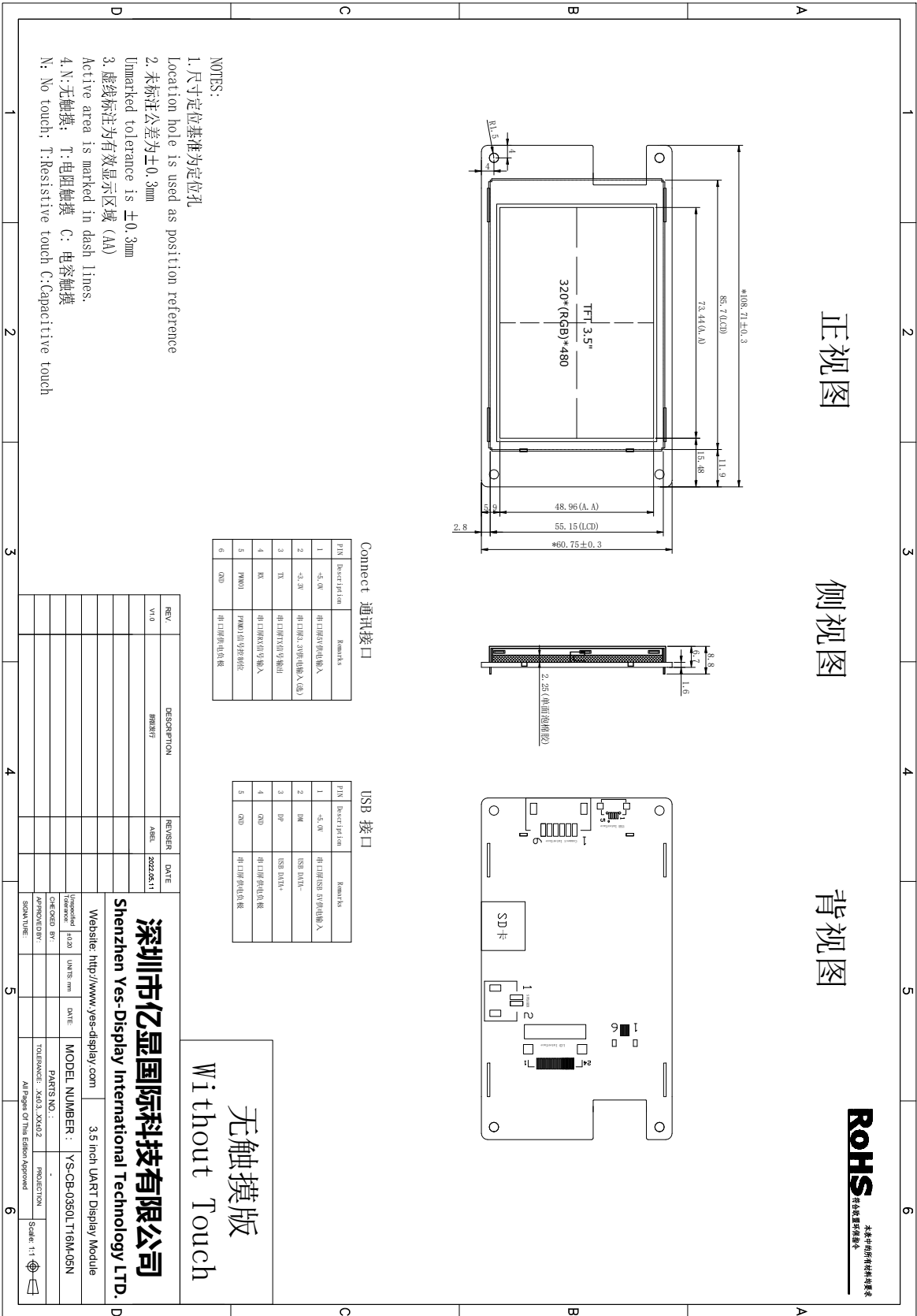
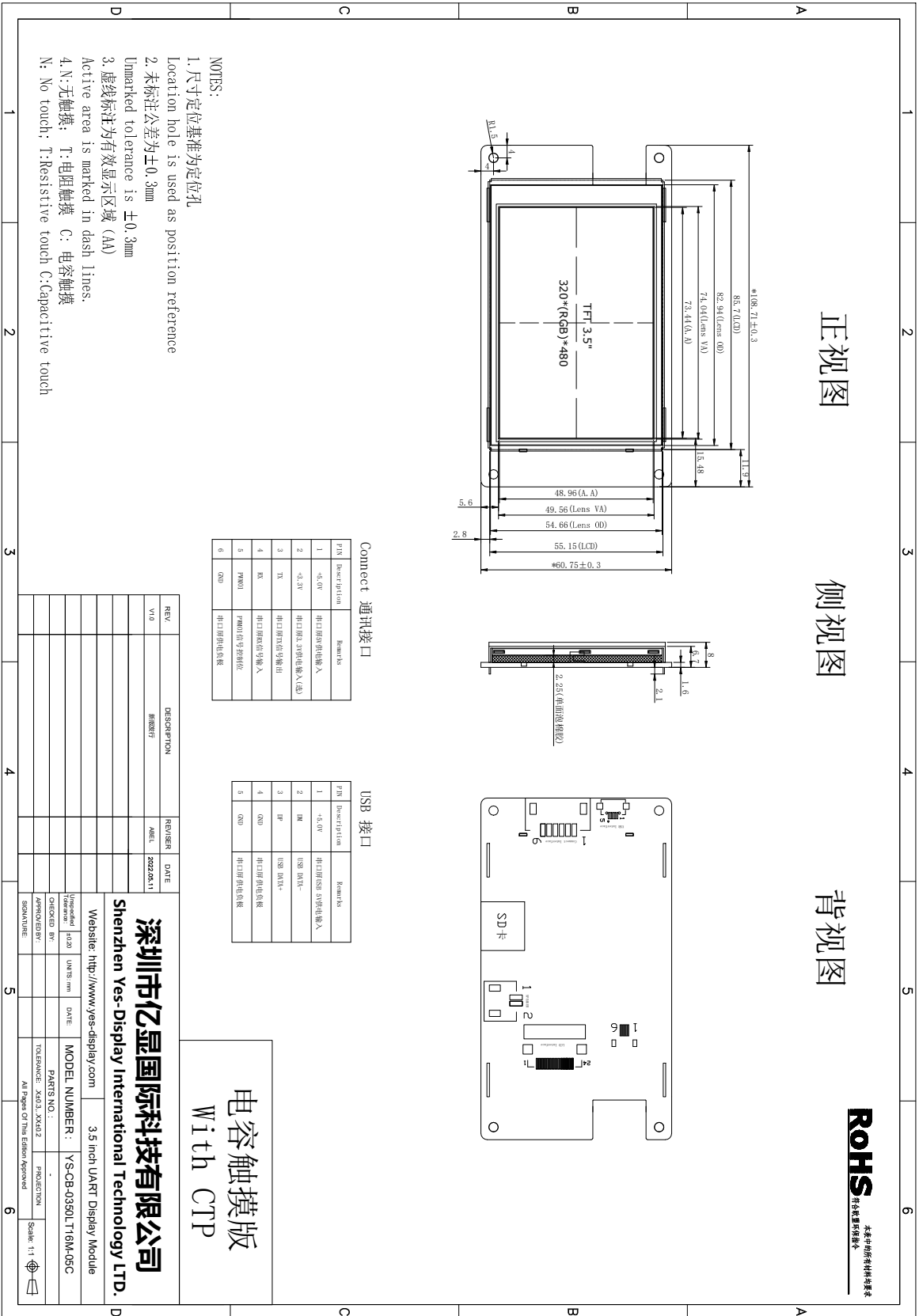


Figure 1-7: Example 2 of serial port screen

In order to ensure the correct data transmission between the master terminal and the TFT serial screen, the instructions sent by the master terminal MCU program also add 1 Byte start code (fixed to 0xAA), 2 Byte CRC codes, 4 Byte end codes (fixed to 0x E4,0x 1B, 0x 11,0x EE), and the TFT serial screen will transmit the MCU to the master terminal after receiving the information or completing the instruction.

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3. 产品图纸 / product drawing				





ROHS
 本产品在制造过程中符合环保要求
 符合欧盟环保指令

深圳市亿显国际科技有限公司
 Shenzhen Yes-Display International Technology LTD.

Website: <http://www.yes-display.com>
 Model Number: 3.5 inch UART Display Module
 Part No.: YS-CB-0350LT16M-05C
 Production Scale: 1:1

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4. 接口定义 / Interface Definition

4.1 通讯接口定义 / Connect Interface Definition

序号 / PIN	定义/ Definition	功能描述 / Functional Description
1	+5.0V	串口屏 5V 供电输入(首选 5V 供电 / Module +5.0V input
2	+3.3V	串口屏 3V 供电输入(次选 3.3V 供电) / Module +3.0V input
3	TX	串口发信号(TTL) / UART(TTL) TX single
4	RX	串口收信号(TTL) / UART(TTL) RX single
5	NC	NC
6	GND	供电负极 / Power ground

4.2 USB 接口定义 / USB Interface Definition

PIN / 序号	Definition / 定义	Functional Description / 功能描述
1	+5.0V	串口屏 USB 5V 供电输入 / USB +5.0V input
2	DM	USB DATA-
3	DP	USB DATA+
4	GND	USB 供电负极 / Power ground
5	GND	USB 供电负极 / Power ground

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5. 产品技术参数 / Product Technical Parameters

5.1 产品参数 / Product Parameters

核心处理器	MCU Chip-Set	32 位双核处理器	32 ARM MCU
协议类型	Protocol type	UART/TTL 组态指令集	UART/TTL
尺寸	Size	3.5 寸	3.5 inch
分辨率	Resolution	480*320	480*320
存储空间	Storage Space	标准:8Mbit(大小可选,最大支持128Mbit)	8Mbit / 128Mbit
字库	Font library	内置矢量字体,边缘抗锯齿处理,包含任何大小点阵 ASCII、GBK、GB2312、字库;	Built-in vector font, edge anti-aliasing processing, including any size bitmap ASCII, GBK, GB2312,
图片存储	Photo storage	支持 JPEG、PNG (半透/全透) 压缩,支持任意大小图片存储,支持图片旋转、放大、缩小等功能。图片压缩比不同,此值会上下浮动;	Support JPEG, PNG (half through/full through) compression, support arbitrary size image storage, support image rotation, zoom, zoom and other functions. The image compression ratio is different, this value will float up and down;
颜色	color	65K 色, 8 位 RGB	65K, 8Bit RGB
电压	voltage	5.0V /3.3V	5.0V /3.3V
功耗	Power consumption	0.5W	0.5W
通讯接口	Communication interface	RS232/TTL(出厂默认 TTL)	RS232/TTL(Default TTL)
接口规格	Interface Specification	标准:PH1.25-6P	PH1.25-6P
图片下载	Images download	UAR	UAR
实时时钟(RTC)	RTC	—	—
配套上位机软件	PC software	YS_UI_Editor_V3.0	YS_UI_Editor_V3.0

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5.2 LCD显示屏参数 / LCD Display parameters /

显示器类型	LCD type	TFT 3.5 寸液晶显示屏	3.5 inch display
背光灯管	Back light	LED	LED
亮度 (cd/m ²)	brightness (cd/m ²)	300	300
背光灯寿命 (h)	Back light life time (h)	>20,000	>20,000
对比度	contrast	400:1	400:1
视角 (L/R/T/B)	View Angle (L/R/T/B)	45/20/45/45	45/20/45/45

5.3 触控面板参数 / Touch Panel Parameters

触控类型:	Touch panel type:	电阻触摸屏	RTP
触控方式:	Touch Way:	单点、滑动触摸	Single, touch
透光率:	Light Transmittance:	80%以上	80%
触控次数	Touch Times	单点 100 万次以上	1,000,000 times

5.4 产品应用特点 / Product application characteristics

学习周期	Learning cycle	10 分钟熟悉开发环境, 1 天完成人机交互设计	10 minutes to get familiar with the development environment, 1 day to complete the man-machine interaction design
程序调试	Program debugging	上位机集成了“虚拟串口屏”, 无需连接硬件,	The host computer is integrated with a "virtual serial port screen", which requires no hardware connection.
启动时间	Start-up time	上电即运行, 无系统加载时间	Power on the run, no system load time
组态控件	Configuration control	拥有按钮、文本、下拉菜单、进度条、滑块、仪表、动画、二维码、曲线、圆形进度条等各种组态控件	Has buttons, text, drop-down menu, progress bar, slider, instrument, animation, two-dimensional code, curve, circular progress bar and other configuration controls
在线升级	Online upgrade	支持屏幕工程图片、固件、用户 MCU 固件在线 USB 升级	Support screen engineering picture, firmware, user MCU firmware online USB upgrade
图层技术	Layer technology	系统内置多个显示图层, 切换速度更快	The system has multiple built-in display layers, and the switching speed is faster
可靠性	reliability	产品均通过行业标准的高低温、ESD、群脉冲和辐射等测试	The products have passed the industry standard of high and low temperature, ESD, group pulse and radiation tests
生命周期	Life time	持续稳定供货, 不断货	Continuous and stable supply, continuous goods

ShenZhen Yes-Display International Technology CO.,LTD. 深圳市亿显国际科技有限公司			3.5 Inch UART Display Module 3.5 寸串口显示屏	
File NO.		REV	A/01	http://www.yes-display.com

5.5 Environmental testing and certification / 环境实验与认证

工作温度	operating temperature	-20~+70℃	-20~+70℃
存储温度	Storage temperature	-30~+80℃	-30~+80℃
震动测试	Vibration test	10 to 25Hz (X, Y, Z 方向 2G 30 分钟)	10 to 25Hz (X, Y, Z direction 2G 30)
ESD 测试	ESD Test	Air=±8KV, Contact=±4KV (常规指标, 可支持更高)	Air=±8KV, Contact=±4KV
高低温测试	High and low temperature test	实验温度: 60℃ ± 3℃ 72H / -10℃ ± 3℃ 72H; 实验湿度: 50℃ ± 3℃, 90% ± 3% RH 72H	The experimental temperature: 60℃ ± 3℃ 72H / -10℃ ± 3℃ 72H; The humidity: 50℃ ± 3℃, 90% ± 3% RH 72H
认证	certification	ROHS、CE 认证 (EMI 等级: EN55022 Class B 标准)	ROHS、CE (EMI: EN55022 Class-B)

5.6 Customized development service / 定制开发服务

定制费用	Customized fee	一次性签订 300PCS 合同, 可免收定制费	For free when the order > 300PCS
通讯接口	Communication interface	可定制并行总线、RS485 等外通讯接口	Can customize parallel bus, RS485 and other external communication interface
硬件电路	hardware circuit	定制 PCB 尺寸厚度、添加板级用户电路、选用指定 TFT 品牌	Customize PCB size and thickness, add board-level user circuit, select the specified TFT brand
功能定制	customization	根据用户产品定制特殊指令或控件, 降低用户开发难度	According to the user product custom special instructions or controls, reduce the user development difficulty
美工服务	Design service	可提供图片美工及产品结构设计服务	Can provide graphic design and product structure design services
其它	others	按需定制, 满足用户一切需求	Customized to meet all user needs

6. 可靠性实验测试 / Reliability Test Conditions and Methods

串口屏经过一系列的可靠性实验测试:高低温,ESD,脉冲,辐射,触摸寿命等测试,确保产品品质,如下图所示:

The serial port screen has undergone a series of reliability tests: high and low temperature,ESD, pulse, radiation, touch life, etc., to ensure product quality, as shown in the following figure:



7. UI 设计软件介绍 (中文部分)

7.1 UI_Editor 介绍






UI_Editor.exe 是一款以串口屏为对象的 图文 UI 编译器。它的功能是根据客户的需求，将串口屏要用到的图片、文字、配置数据等信息打包生成 BIN 档。客户可以使用 UI_Editor 简单、快捷的制作 UI 界面，之后将生成的 BIN 文档烧录到 SPI Flash 中。

注意：UI_Editor 是在 Microsoft .NET Framework 4.6.2 的环境中编写出来的，所以电脑系统必须安装 Microsoft .NET Framework 4.6.2 才能正常使用。












UI_Editor 的界面由各种按钮和屏幕框组成，如下图所示：



所有的 UI 设计都在屏幕框内完成，用户根据需求选用不同的功能实现设计。其中各种功能键的详细功能如下：

-  在 UI_Editor 上以图片形式显示文字
-  添加图片按钮
-  添加控件按钮
-  添加 GIF 图按钮
-  添加数字按钮（图片）

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6.  添加文字按钮（字库）
7.  添加二维码按钮
8.  添加表格
9.  添加画圆环（任意角度）
10.  添加进度条按钮
11.  添加触控滑动条按钮
12.  分别是画矩形、画圆角矩形、画圆、画椭圆
13.  分别是画线、画三角形、画四边形、画五角形、画圆柱体、画长方体
14.  添加指针按钮
15.  分别是撤回操作和恢复操作按钮（当无任何操作时初始画面是 ）

与 UI_Editor 工具同级的有几个文件夹，它们的作用如下图所示。

- FONT 文件夹用来存放需要使用的字库
- PICFILE 文件夹用来先存放需要使用到的图片文件
- PROJECT 文件夹备份着每次 Save 和 Build 的工程文件
- SOURCE 文件夹用来存放音频和光标 BIN 文件

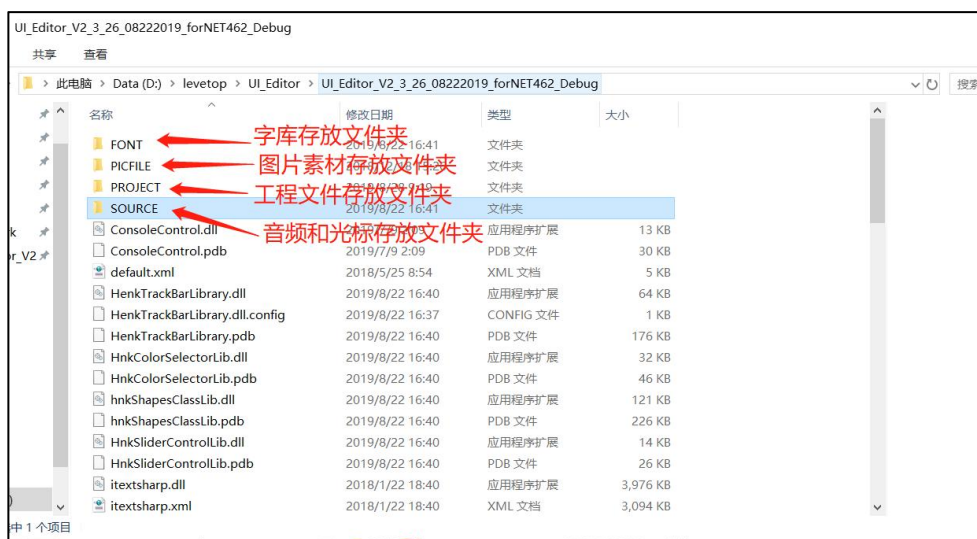


图 2: UI_Editor 工具同级文件目录

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PROJECT 文件夹下级的工程文件里有几个文件夹，它们的作用如下图所示。

- BINFILE 文件夹存放着编译好的 BIN 文件，需要烧录的 UserInfo 和 UartTFT_Flash 就存放在此处。
- COMMANDFILE 文件夹存放着工程储存文件
- PICFILE 文件夹存放着编译后的图片文件
- SRCPIC 文件夹存放着编译前的图片

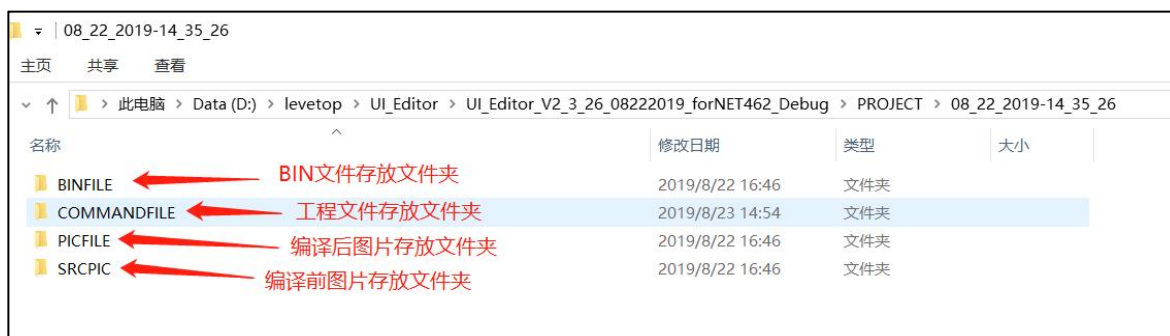


图 3: PROJECT 文件夹下级的工程文件目录

在菜单按钮里，有 New Project、load 和 save 三个按钮。分别用来创建新工程、装载工程文件、保存当前工程。按 save 按钮会把工程以 mainControlFiles.xml 文件保存在 PROJECT 下级中以时间命名的 COMMANDFILE 文件夹里。使用 Load 功能在 PROJECT 下级找到对应时间的文件夹里 COMMANDFILE 文件夹的 mainControlFiles.xml 文件，就可以重新加载工程。



图 4: UI_Editor 重装载工程文件

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7.2 使用 UI_Editor 的设计流程

下图为用图文 UI 编译器 (UI_Editor.exe) 开发的详细流程图，将更快速的了解开发模式。同时建议用户先依据所需功能及 TFT 屏幕大小准备好素材，因为这些显示图片、动画文件、文字库、声音文件等是存放在 SPI Flash 内，资料量都不小，而 SPI Flash 的烧录所需时间较长，因此尽量避免开发中反复对 SPI Flash 进行 UartTFT_Flash.bin 档的烧写，以免延误开发效率。

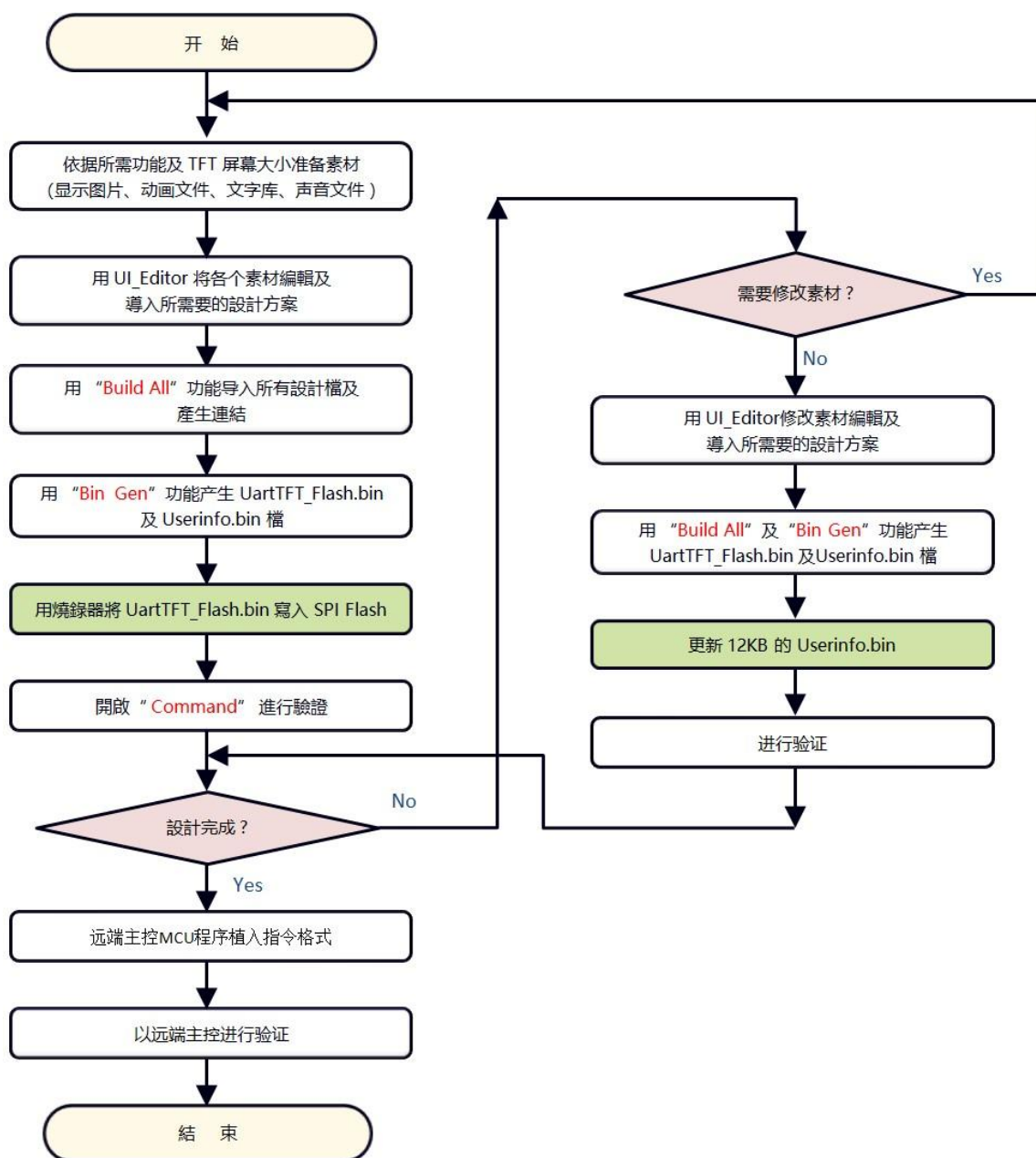


图 5: 使用 UI_Editor 的设计流程

7. PC Software (English Part)

7.1 UI_Editor introduction








UI_Editor.exe is a visual UI compiler provided by Yes-Display. Its function is to package images, text, configuration data and other information to be used by the UI to generate BIN files according to customer requirements. Customers can use UI_Editor to make UI easily and quickly.







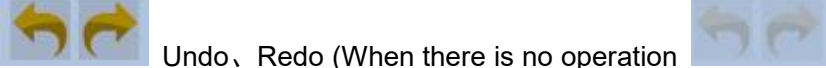
Notice: UI_Editor is written in the environment of Microsoft.net Framework 4.6.2, so the computer system must be installed with Microsoft.net Framework 4.6.2 to work properly.

The interface for UI_Editor consists of various buttons and screen frame, as shown below:



All UI design is completed in the screen frame, and users choose different functions to realize the design according to their needs. The detailed functions of the various function keys are as follows:

1.  Display text with images
2.  Image
3.  Button
4.  GIF
5.  Display numbers graphically
6.  Display text with font library
7.  QR code
8.  Tabulation

9.  Arc
10.  Progress bar
11.  SeekBar
12.  Rectangle、Rounded rectangle、Circle、Ellipse
13.  Straight line、Triangle、Quadrangle、Pentagon、Cylinder、Quadrangle prism
14.  Pointer
15.  Undo、Redo (When there is no operation)

There are several folders in the same folder as the UI_Editor.exe, and their functions are shown below.

- FONT is for The font library needed to be used
- PICFILE is for the images needed to be used
- PROJECT is for backup the project files for each Save and Build
- SOURCE is for audio and cursor Bin files

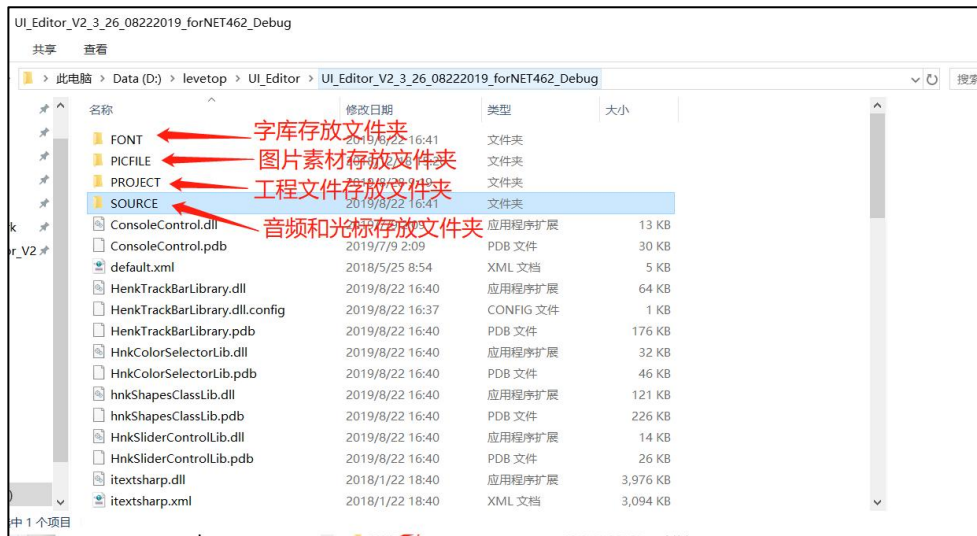


图 2: UI_Editor Folder

There are several folders in the PROJECT folder, and their action is shown below.

- BINFILE is contains the compiled BIN file, and the UserInfo and UartTFT_Flash that need to be burned are stored here.
- COMMANDFILE is for project document
- PICFILE is for the compiled image files
- SRCPIC is for the original images

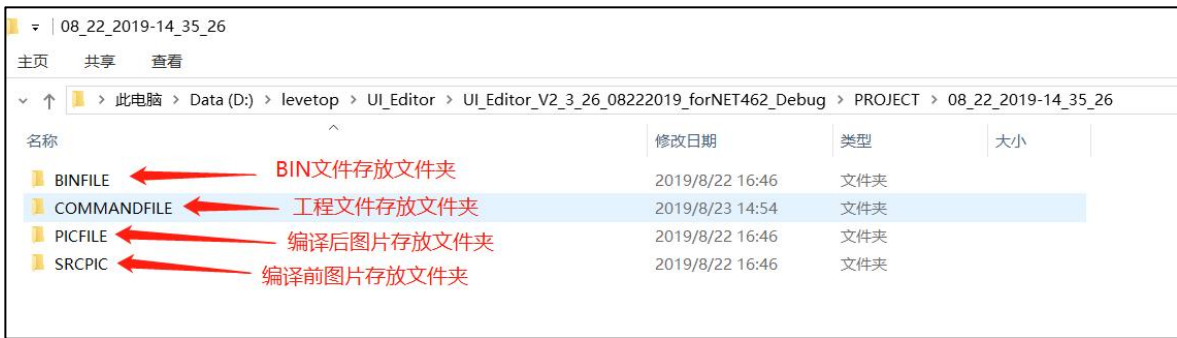


Figure 3: PROJECT folder

In Workspace options, there are three buttons: New Project, load and save. They are used to create a new project, load the project file, and save the current project. Press Save will save the project as a mainControlFiles.xml file in the COMMANDFILE folder of a time-named folder in PROJECT. The project can be reloaded by opening the maincontrolfiles.xml in the COMMANDFILE folder in the time-named folder with Load.



Figure4: UI_Editor Reload Project File

7.2 Use UI_Editor to design flow

The following figure is a detailed flowchart developed with UI_Editor. Users can also download UI_Editor demo (It7688_ui_editor_demo.rar) from Yes-Display.com to understand the development mode more quickly. At the same time, it is recommended that the user first prepare the material according to the required function and TFT panel size. Because these images, GIF files, font library, audio files are stored in SPI Flash, the amount of data are not small. SPI Flash takes a long time to burn, so try to avoid repeatedly burning UartTFT_Flash.bin during development, so as not to delay the development progress. Yes-Display's TFT Panel development demo board suite includes SPI Flash programmer, which can be downloaded from Yes-Display.com

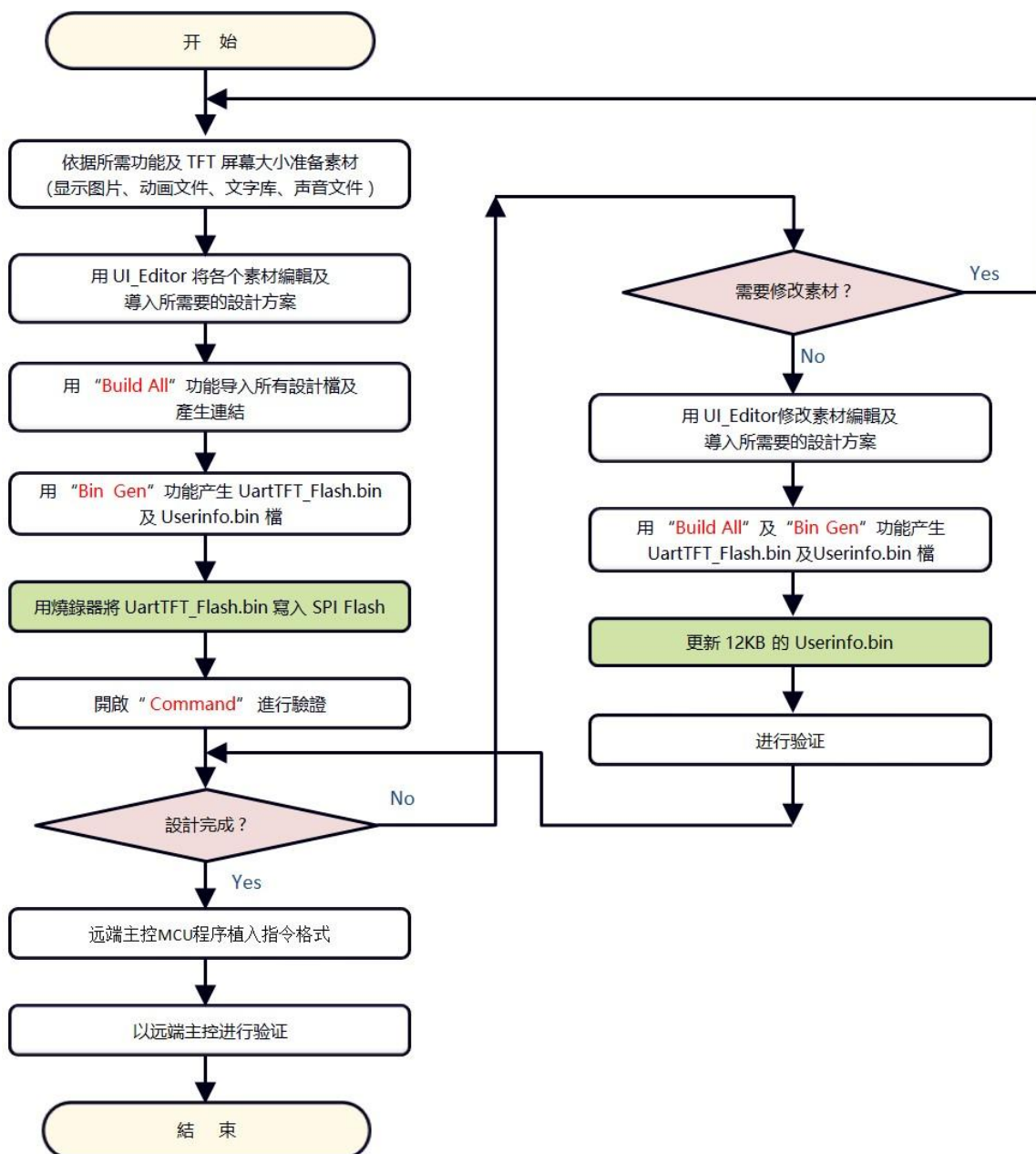
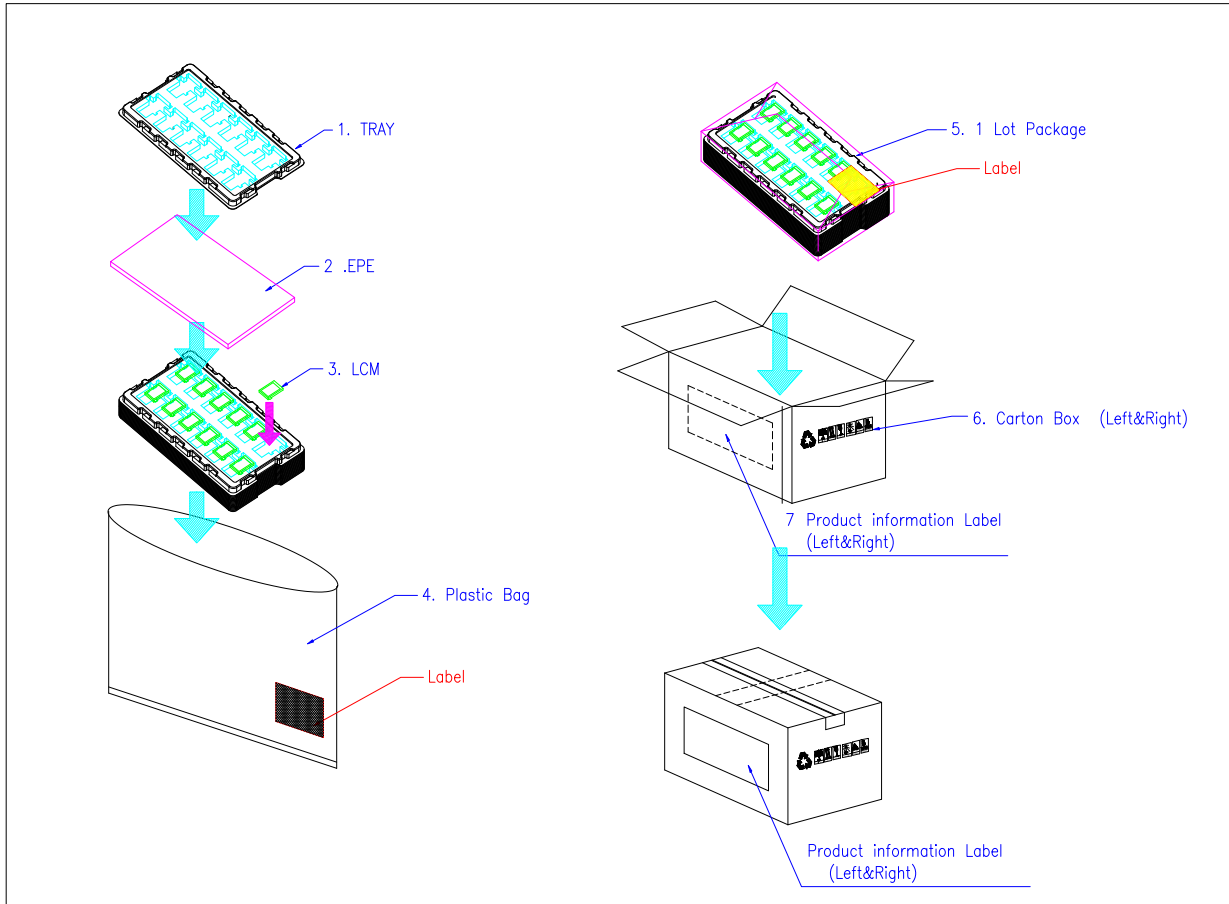


Figure 5: Design flow using UI_Editor

8. 包装方式 Packing Method

8.1 包装方式 / Packing Method



8.2 产品标签 / Packing Label

TBD