

T5L_TA Instruction Screen Development Guide Based on AIoT LCM Platform V2.0



Catolog

- 1 Version Record..... 1
- 2 Declaration and Service..... 2
- 3 Selection Guide..... 3
 - 3.1 Naming Rules.....3
- 4 Introduction of Command Set Development for AIOT LCM..... 4
 - 4.1 Overview..... 4
 - 4.2 Kernel Version Development Mode Description.....5
 - 4.3 Flash Memory Description.....5
 - 4.4 Download File Description..... 6
 - 4.4.1 Core file, Font Library, Icon/Picture Library, Music File Description.....6
 - 4.4.2 .cfg System Configuration File Description..... 8
 - 4.5 Display Configuration Reference..... 10
- 5 Hardware Interface..... 12
 - 5.1 Communication/Power Interface..... 12
 - 5.2 SD/TF Card Interface..... 12
 - 5.3 Voice Interface..... 13
- 6 Quick Start..... 14
 - 6.1 Development Process..... 14
 - 6.1.1.Function Plan and Interface Design.....14
 - 6.1.2. Touch Configuration (Skip if no-touch panel).....14
 - 6.1.3. Test Modification..... 14
 - 6.1.4. Finalized Archive..... 14
 - 6.2 Software Installation..... 14
 - 6.2.1 Installation Environment Requirements..... 14
 - 6.2.2 Installation Steps..... 15
 - 6.3 Hardware Interface Connection and Debugging..... 15
 - 6.3.1 Connect Screen to the Computer..... 16
 - 6.4 Software Operation Instructions..... 17
 - 6.4.1 Touch Control Production Software "DW_TouchConfig.exe"..... 18
 - 6.4.2 Picture and Video Processing Software "AllToolForAIOT V** .exe" 23
- 7 Download..... 24
 - 7.1 MicroSD (TF) Card Download Format Requirements.....24
 - 7.2 SD interface Download Process Description..... 24
- 8 Serial Port Instruction set Description..... 27
 - 8.1 Serial Working Mode..... 27
 - 8.2 Data Frame Structure..... 27
 - 8.3 Byte Transfer Order.....27
 - 8.4 Coordinate System..... 28
 - 8.5 Command Quick View Table.....28
 - 8.6 Partial Command Function Description and Aapplication..... 33
 - 8.6.1 Handshake Command..... 33
 - 8.6.2 Set the Current Palette..... 33



- 8.6.3 Clear the Screen..... 34
- 8.6.4 Set Character Display Spacing..... 34
- 8.6.5 Take the Specified Position Color.....34
- 8.6.6 Factory Pre-installed Standard Font Display.....35
- 8.6.7 Specify the Format Content to Display String (Select font to display).....35
- 8.6.8 Full Screen Picture Display..... 36
- 8.6.9 Cut Icon Display..... 36
- 8.6.10 .ICM Icon Display.....37
- 8.6.11 Fancy Picture Switching..... 37
- 8.6.12 Buzzer Control..... 37
- 8.6.13 Backlight Control.....38
- 8.6.14 Backlight Brightness Adjustment..... 38
- 8.6.15 QR Code Display..... 38
- 8.6.16 Set point, Connection Display..... 39
- 8.6.17 Rectangle, Area Inverted Color, etc. Display..... 39
- 8.6.18 Touch Panel Operation 78/79 Command.....39
- 8.6.19 72/73 Command for Touch Panel Operation..... 40
- 9 Data Buffer Command Set Description..... 41
- 10 Steps for Converting Video Files into Pictures and Music Files..... 46
 - 10.1 Process Into Picture File..... 46
 - 10.2 Process into Sound File.....46
 - 10.3 UIF Generation Tool Description..... 47
 - 10.4 SD Card Stores Audio (.WAM) or Static Video (.ICM) File Playback Instructions48

1 Version Record

Version	Date	Description	Remark
V1.0	2020-04-03	Initial Release	
V12	2020.06.16	Added SD card storage audio and static video file playback functions.	
V20	2020.07.31	The hardware platform is upgraded to V2.0, and the software version needs to use V2.0 or above; Remove the PWM1 control interface; Added 0x64 enclosed area filling command.	The hardware version used by the user must be consistent with the kernel software version.
V20	2020.10.10	Added 0x95 GTF icon display command.	The hardware version used by the user must be consistent with the kernel software version.

2 Declaration and Service

If you have any questions or want to know more about the latest information of DWIN products during the use of this file or DWIN products, please contact us in time:

400 toll-free:400 018 9008

Enterprise QQ and WeChat:400 018 9008

Enterprise mail: dwinhmi@dwin.com.cn

Thank you for your continuous support to DWIN. Your support is the driving force for our progress!

If any errors or misunderstandings in the document, please give us comments and suggestions so that we can revise and improve it in time. Thank you all!

It's forbidden to use DWIN products as key components in any life support system without the written consent of DWIN.

It 's strictly forbidden to copy and/or distribute this document in whole or in part without the written consent of DWIN.

DWIN shopping link:

https://dwin-tech.en.alibaba.com/company_profile.html?spm=a2700.supplier-normal.35.3.1ea76061LWHzsY#top-nav-bar

DWIN Technology Forum:

<http://forum.DWIN.com.cn/forum.php>

Welcome to follow DWIN Facebook account and YouTube account



Facebook



YouTube

3 Selection Guide

This chapter introduces the naming rules of DWIN smart display terminal.

3.1 Naming Rules

▶ Take **DMT10768T080-A2WT** as example

DM	The product line of DWIN smart LCMs
T	Color: T=65K color(16bit) G=16.7M color(24bit)
10	Horizontal resolution: 32=320 48=480 64=640 80=800 85=854 10=1024 12=1280 13=1364 14=1440 19=1920
768	Vertical resolution: 240=240 480=480 600=600 720=720 768=768 800=800 108=1080 128=1280
T	Application Classification:M / L=Simple application grade C=Commercial grade T=Industrial grade K=Medical grade Q= Automotive grade S=Military grade F=Product integration application solution platform
080	Display size: 080=Diagonal size of the screen is 8 inch
-	
A	Classification,0-Z,Where A refers to DWIN smart LCMs based on DGUSII kernel
2	Hardware serial number:0-9 stand for different hardware versions
W	N=Normal Temperature W=Wide Temperature
T	N=Without Touch Panel TR=Resistive Touch panel TC=Capacitive Touch panel T=With Touch Panel (Distinguish touch panel category by serial number)
Note1	None=Standard product Z**=ODM product, **ranges form 01 to 99
Note 2	None=Standard product F*=Extended Flash (F1=1GB F2=2GB)

4 Introduction of Command Set Development for AIOT LCM

This chapter includes the development mode of the screen, Flash memory usage, and material files.

4.1 Overview

The main features of the AIoT LCM platform based on T5L ASIC include:

- (1) Based on T5L dual core CPU, both GUI and OS cores run at 353.8944MHz frequency, with faster graphics processing speed:
 - (a) On-chip video memory bandwidth is up to 4.2GB/S;
 - (b) The decompression speed of 1920*1080 HD JPEG pictures reaches 200FPS (4:1:1 compression mode).
- (2) 24bit true color display, the max resolution is up to 1920*1080;
- (3) Adopt 4Gb (512Mbytes) SPI NAND Flash,
 - (a) Can store massive JPEG pictures, icons, music and video;
 - (b) Up to 120MHz high-speed DMA off-chip Flash data reading, 35MB/S data reading rate, making the UI smoother;
 - (c) 5MB/S write mode, data backup/copy function, more suitable for remote upgrade and update.
- (4) SD/SDHC interface download and configuration speed is up to 4MB/S.
- (5) Support I2S interface high-fidelity stereo music playback
- (6) Support buzzer, RTC.
- (7) OS CPU core can be open to users for secondary development: UART*4、CAN*1、IO*26、12bit AD*4、16bit PWM*1
- (8) Support all UI functions based on T5L TA instruction set, and the difference from the standard TA command screen based on T5L are:
 - (a) A single font space is expanded from 256Kbytes to 2Mbytes;

The font ID corresponding to the 0x54/0x55/0x6E/0x6F command should be adjusted:

12*12 dot matrix GBK font is stored in 2# font;

16*16 dot matrix GBK font is stored in 3# font;

24*24 dot matrix GB2312 font is stored in 4# font;

32*32 dot matrix GB2312 font is stored in 5# font.

(b) Use the new formatUI file:

Images, icon files are upgraded from ICL files to ICM files;

The sound file is upgraded from WAE file to WAM file;

The touch configuration file 13.bin is upgraded to 13.UIF file. The boot interface, touch panel sound are set in



UIF file;

Added support for the configuration font library .GTF, easier to display custom fonts and icons.

(c)The 64KB temporary storage buffer is upgraded to 256KB data buffer, and the system variable control interface is added to facilitate audio and video playback and function expansion. At the same time, 0xC2 command adds address information when responding.

(d)Support RTC;

(e)Support audio and video playback, audio and video synchronization;

(f)Support extended digital interface camera (such as OV2640, hardware customization required).

(g)OS CPU kernel can be opened to users for secondary development.

(9) Support SD card storage audio (.WAM) or static video (.ICM) file playback.

4.2 Kernel Version Development Mode Description

T5L includes T5L1 (max resolution 1280*800, 24bit color) and T5L2(max resolution 1920*1080,24bit color) based on different display resolution, which respectively adopt 55nm(T5L1) and 40nm(T5L2) process, to ensure the best cost performance for users.

4.3 Flash Memory Description

512Mbytes Flash memory can be regarded as a sub-storage space divided into 256 serial numbers, each with a fixed capacity of 2Mbytes. (If the user's single font file exceeds 2M, the size of the subsequent font file serial number needs to be calculated.

Reserve the naming serial number.)

It can save fonts, music format files, icon libraries (including full-screen background image library, video image library, small icon image library).Kindly note that the ID location of the background image .ICM format file needs to be saved in the 13# font location hardware configuration settings(.UIF format file) for the underlying processing to load and recognize. The icon library file needs to be generated by the DWIN.ICM tool.

For the .ICM format file package under the T5L1 platform, the size of a single JPG image should not exceed 252Kbytes. In the T5L2 platform, a single JPG image cannot exceed 764Kbytes. If the image compressed by the .ICM generation tool is too large and exceeds the above threshold, it will not be displayed normally.

Info:

1. There are no specific requirements for the format of the original picture material. Bmp\,jpg\...picture format files are all acceptable. It doesn't matter if the original material size exceeds 252Kbytes\764Kbytes. It can be processed by DWIN PC software. When the generation tool generates the .ICM file, due to the inconsistency of the display complexity of the image

such as the gradient of the picture, the size of the final compressed single .JPG file will be different. If exceeds the corresponding max value after generation, the PC software will point that the user needs to lower the JPG image quality percentage slightly.

2. The picture ID displayed by default after the screen is powered on needs to be configured with a 13*.UIF file to load. It is recommended that the picture naming order start from 0. Picture UI with blank ID will not be displayed. If the command calls a blank page ID, the UI kernel will not respond.

4.4 Download File Description

4.4.1 Core file, Font Library, Icon/Picture Library, Music File Description

The SD/SDHC interface of the serial command screen based on T5L supports the download and update of the following files.

The files that users actually need to download are as follows:

File type	Naming rules	Description		
GUI kernel file	T5L_UI*.BIN	The underlying kernel firmware application. As the software functions are continuously upgraded, the kernel version may be different depending on the time of purchase, and usually the higher version is compatible with the lower version.		
OS kernel program file	T5L_OS*.BIN	Under normal circumstances, the kernel version is already the optimal version when the serial screen is delivered. Unless there are special necessary functional requirements, users generally don't need to upgrade by themselves. (Note: The UI_V20 kernel version is not compatible with the old version of the hardware. Users contact the technical support to confirm it first before upgrades the kernel)		
	T5L51*.BIN	User program developed based on 80 C51 or ASM51.		
(512MB) font file/JPEG picture/icon file, music file, according to the actual size of the file, the user will reserve the location name based on the rule that each ID occupies 2Mbytes	File ID+file name(optional).. ICM/.WAM/ .BIN/.DZK/.HZK.UIF Named ID range: 00-254;	Example	Explanation: the green part of the font library comes with the factory. Users can replace the factory-installed font library space with their own font library according to actual needs.	Size
		0_DWIN_ASC.HZK	Factory pre-installed font library (Song Ti); ASCII font library uses DGUS 0# font library;	3011KB
		2_GBK_12_Song Ti.HZK	Factory pre-installed font library; used for 0x6E or	562kb

			0x98 command to display 12*12 GBK character string.	
		3-GBK_16_Song Ti.HZK	Factory pre-installed font library; used for 0x54 or 0x98 command to display 16*16 GBK character string.	749kb
		4_GB2312_24_Song Ti.hzk	Factory pre-installed font library; used for 0x6F or 0x98 command to display 24*24 GB2312 character string.	608kb
		5-GB2312_32_Song Ti.hzk	Factory pre-installed font library; used for 0x55 or 0x98 command to display 32*32 GB2312 character string.	1105kb
		Font ID 6-11	Other documents can be stored.	12MB
		12*.BIN	Factory pre-installed font library; used for QR code display.	173Kb
		13*.UIF	Generated by UIF generation tool, used to save touch configuration files, power-on startup page settings, buzzer\speaker\mute mode settings.	<2MB
		Font ID 14~254* ICM/.WAM/ .BIN/.DZK/.HZ K	Other custom dot matrix font files can be stored. Must be JPEG icon library file format in DGUS III format; According to actual applications, it is generally divided into three files of the same type: background image library, video image library, and icon image library. The naming should not conflict with the naming ID of the ..ICM file or occupy the space. Please calculate the actual size.	- <448MB

Hardware configuration file	T5LCFG*.CFG	Configure CRC on, modify baud rate, text background color recovery control, touch upload mode, display direction, etc. (For the specific configuration, please refer to the description in the following table 4.4.2)
-----------------------------	-------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

The downloaded file must be placed in the DWIN_SET folder in the root directory of the SD card, and must be a 4KB sector (cluster), FAT32 format SD or SDHC card.

When using a SD card to store audio and video files for playback, you need to format the SD card to 64KB sector (cluster) size to increase the reading speed, and then put the audio and video files directly in the root directory of the SD card. The file is named with ID from 32768 to 65535 +file name.

4.4.2 .cfg System Configuration File Description

The T5LCFG*.CFG hardware configuration file adopts binary data format, and can be edited with software such as UltraEdit.

The description is as follows:

Category	Address	Length	Definition	Explanation
Configuration recognition	0x00	5	0x41 0x49 0x6F 0x54 0x31	Fixed content.
System configuration value	0x05	1	Parameter configuration	.7: Serial port CRC check selection 0=off ;1=on; .6: Touch switch 0=off (0x72/0x73) ;1=on (0x78/0x79); .5: Whether to upload data while pressing the touch panel 0=upload; 1=not upload; .4: Background color restoration control of text display 1=automatic restoration ; 0=no automatic restoration; .3: Touch panel mode selection 0=upload 73/79 command ; 1= not upload 73/79 command; .2:Reservation, write 0; .1-.0:Display direction 00=0° 01=90° 10=180° 11=270°.
	0x06	1	Reservation	Write 0x00.
	0x07	2	NAND FLASH format	Write 0x5AA5 to start a NAND Flash format (data will be lost). It has been formatted in the factory, and the user does not need to format the NAND Flash again.
	0x09	1	Touch panel reporting rate setting	The setting range is 0x01-0xFF, the factory value is 0x28, and the reporting rate=400Hz/setting value.
	0x0A	2	Reservation	Write 0x00.
0x0C	3	Serial port baud rate setting value	The unit is bps, the lowest baud rate is 5400bps, and the highest baud rate is 11.0592Mbps. 115200bps set 0x01 C2 00.	

	0x0F	1	Power-on backlight brightness	0x00-0x40, the factory setting value is 0x40.
Display configuration	0x10	2	Display_Config_En	0x5AA5=Valid display configuration, Others=no display configuration. Configured at the factory. No extra operation by users, just write 0x0000 If the display is abnormal due to a configuration error, please contact DWIN 400 customer service to request the factory CFG configuration to download and recover.
	0x12	1	PCLK_PHS	Data latch phase setting: 0x00=PCLK falling edge 0x01=PCLK rising edge.
	0x13	1	PCLK_DIV	Pixel clock PCLK frequency setting, PCLK frequency (MHz)=CPU main frequency/PCLK_DIV.
	0x14	1	H_W	
	0x15	1	H_S	
	0x16	2	H_D	The horizontal (X direction) resolution of the screen.
	0x18	1	H_E	
	0x19	1	V_W	
	0x1A	1	V_S	
	0x1B	2	V_D	The vertical (Y direction) resolution of the screen.
	0x1D	1	V_E	
	0x1E	1	TCON_SEL	0x00=No need to configure TCON.
	0x1F	1	Reservation	Write 0x00.
	Touch panel configuration	0x20	1	TP_Set_En
0x21		1	TP_Mode	Touch panel mode configuration. .7-.4 (high 4bit), select the touch panel type: 0x0*=4-wire resistive touch panel; 0x1*=GT911, GT9271, GT9110 driver IC capacitive touch panel; 0x2*=ILI9881H Incell CTP; 0xF*=5-wire resistive touch panel. .3 Resistive touch panel calibration: 0=off; 1=on, only enabled during SD download. .2-.0 (lower 3bit), select the touch panel mode: .2 X-axis data selection: 0=0 to Xmax; 1=Xmax to 0;



				.1 Y-axis data selection: 0=0 to Ymax ;1=Ymax to 0; .0 Exchange of X and Y: 0=XY; 1=YX.
	0x22	1	TP_Sense	Touch panel sensitivity setting: 0x00-0x1F, 0x00 is the lowest, 0x1F is the highest. The factory setting value is 0x14, higher sensitivity. (ILI9881 is 0x01-0x06).
	0x23	1	TP_Freq	Frequency band selection, applicable for ILI9881H, 0x01-0x14 are fixed frequency bands, 0x00 frequency hopping.

Users usually only need to selectively configure the green filled area in the above table, (For example, users only need to configure: turn on touch 0x78 upload, not upload 0x79 commands, touch panel buzzer sound off. Text display automatic refresh background color recovery, baud rate 115200bps), where the second and third lines 0x10~0x30 addresses have been already configured by the factory. No need additional operation by users, just write 0.

4.5 Display Configuration Reference

It is the display configuration mode table configured for the 0x12~0x1F address of the cfg file with different resolutions.

Size_Resolution	T5LCFG*.CFG display configuration value (HEX format)													
	0x12	0x13	0x14	0x15	0x16	0x17	0x18	0x19	0x1A	0x1B	0x1C	0x1D	0x1E	0x1F
2.0_240*320 IPS	01	40	0A	14	00	F0	0A	02	02	01	40	02	11	00
2.4_240*320 IPS	01	40	0A	14	00	F0	0A	02	02	01	40	02	0D	00
2.4_240*320	01	40	0A	14	00	F0	0A	02	02	01	40	02	05	00
2.8_240*320A	01	40	0A	14	00	F0	0A	02	02	01	40	02	03	00
2.8_240*320B	01	35	10	20	00	F0	20	02	0E	01	40	08	01	00
3.5_320*240	01	31	1E	14	01	40	40	03	0F	00	F0	10	02	00
3.5_320*480	01	23	0A	04	01	40	0A	02	02	01	E0	02	04	00
3.5_320*480 (IPS)	01	23	0A	04	01	40	0A	02	02	01	E0	02	06	00
3.5_480*640	01	10	10	20	01	E0	20	02	03	02	80	02	07	00
4.0_480*480 (IPS)	00	17	08	08	01	E0	08	02	0C	01	E0	06	08	00
4.0_480*800 (IPS)	00	0E	08	08	01	E0	08	04	0A	03	20	0A	09	00
4.0_720*720 (IPS Incell)	00	05	70	B4	02	D0	B4	02	14	02	D0	DC	0A	00
5.0_720*1280 (IPS Incell)	00	05	04	14	02	D0	14	02	12	05	00	C8	0A	00
5.0_480*854	00	0D	08	08	01	E0	08	02	0C	03	56	06	0C	00



(IPS)														
4.3_480*800 IPS	00	0E	04	0C	01	E0	08	04	13	03	20	08	0E	00
3.0_360*640 IPS	00	11	20	3C	01	68	20	06	36	02	80	08	0F	00
1364*768eDP	01	05	20	20	05	54	62	06	08	03	00	08	10	00
1920*1080eDP	00	03	32	48	07	80	30	06	03	04	38	03	12	00
480*272	01	27	29	02	01	E0	02	0A	02	01	10	02	00	00
640*480	01	0E	1E	72	02	80	10	03	20	01	E0	0A	00	00
800*480	01	0B	1E	10	03	20	D2	03	14	01	E0	0C	00	00
800*600	01	09	1E	10	03	20	D2	03	14	02	58	0C	00	00
1024*600	01	07	A0	88	04	00	18	06	1D	02	58	03	00	00
1024*768	01	06	10	40	04	00	20	04	08	03	00	04	00	00
1280*720	01	05	10	40	05	00	20	08	20	02	D0	20	00	00
1280*800	01	05	10	1C	05	00	10	08	10	03	20	10	00	00
1366*768	01	05	10	20	05	54	20	06	10	03	00	08	00	00
1024*768 VGA	00	05	88	A0	04	00	18	06	1D	03	00	03	00	00
1280*800 VGA	00	04	80	C8	05	00	48	06	16	03	20	03	00	00
1280*960 VGA	00	03	A0	E0	05	00	40	03	2F	03	C0	01	00	00
1600*900 VGA	00	03	20	50	06	40	30	05	12	03	84	03	00	00

5 Hardware Interface

This chapter describes the interface pin definitions used by users.

5.1 Communication/Power Interface

Pin name	Pin type	Pin description	Socket type		
			CN1Pin NUM.	CN2Pin NUM.	CN3Pin NUM.
VCC	P	Power supply input	1,2	1,2,3	1
TX/DOUT	O	Serial 4output	3	4	2
TX/DOUT	O	Serial 2 output	4	5	3
RX/DIN	I	Serial 2 input	5	6	4
RX/DIN	I	Serial 4 input	6	7	5
GND	P	Ground	7,8	8,9,10	6

Remark:

1. I: INPUT, O: OUTPUT, P: POWER

2. The PCB pins whose pin names are marked with the same defined pins are connected in parallel.

CN1: Use 8 Pin 2.0mm pitch SMD socket(As pic 1);

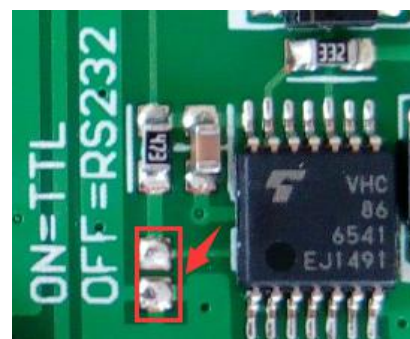
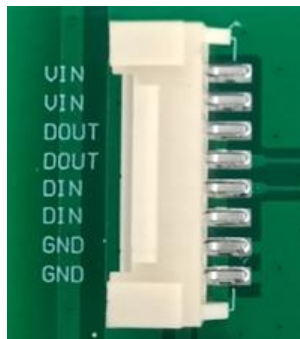
CN2: Use 10 Pin 1.0mm pitch FPC mount(As pic 2);

CN3: Some models retain 8Pin 2.54mm pitch through-hole pads(As pic 1).

3. Some models adopt compatible TTL/RS232 (3.3V) design interface. Users can use 0 ohm resistance or solder to short circuit directly:(As red part in pic 3)

ON=TTL (short),Select TTL level;

OFF=RS232 (cut),Select RS232 level.



5.2 SD/TF Card Interface

Adopt 10PIN PUSH-PUSH self-elastic MicroSD (TF) card socket.

Support copying the underlying kernel firmware, icons, fonts, music files, etc. from the SD card to the FLASH inside the serial screen terminal.

Does not support online hot swap update SD card upgrade. You must power off the screen, insert the SD card, and then power on to download.

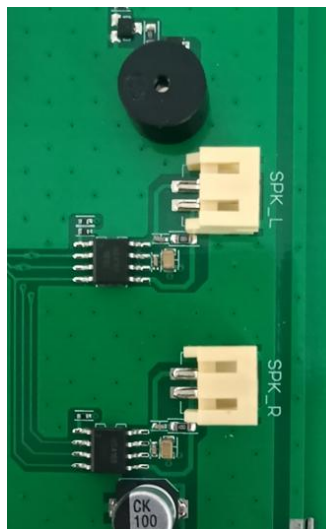
SD/SDHC interface supports the download and update of the following files. The update speed is about 4MB/S.



5.3 Voice Interface

2Pin 2.0mm pitch socket. It is recommended that users can choose a speaker with 8Ω 5W power type. No need to distinguish between positive and negative.

Remark: This series of products use two voice stereo interfaces for left and right channels. Users need to choose 2 speakers, to achieve the best voice playback effect.



6 Quick Start

6.1 Development Process

6.1.1. Function Plan and Interface Design

(1)The picture designers make exquisite pictures according to requirements. Use drawing software to make the base picture of the interface and icons, fonts, button format, and video playback display window. Ensure that the display effect on the screen is consistent with the design effect.

(2)Process video files into picture libraries and sound files downloaded to the screen.

6.1.2. Touch Configuration (Skip if no-touch panel)

Configure the use of touch controls on the page through PC development software, and then click to generate a touch button.

6.1.3. Test Modification

Download via SD card. Put the created pictures, icon. ICM files, font files, etc. into the SD card to download to the screen for debugging and modification.

6.1.4. Finalized Archive

After the version is finalized, you need to save the configuration files, pictures, fonts, icon libraries, etc. and related files to the SD card or U disk for mass production.

6.2 Software Installation

This section explains how to install the operating environment of the PC software DWToolBox.exe.

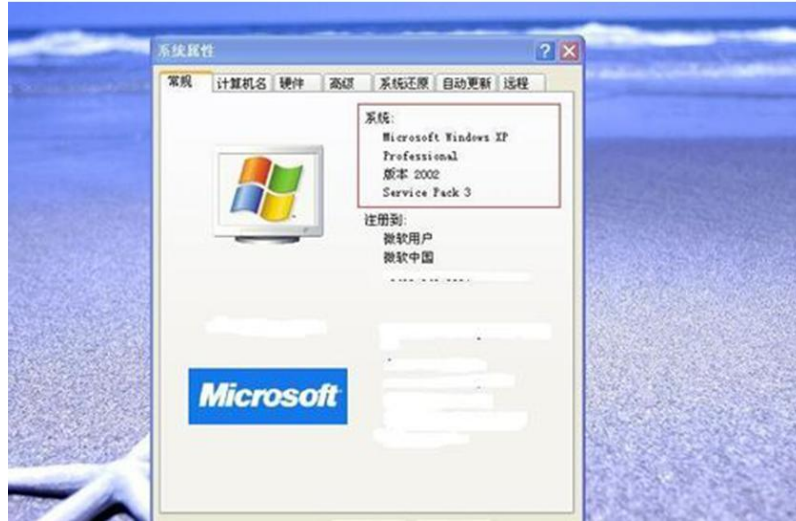
The development of PC software programs in the DWIN TA mode requires the support of .NET Framework (that is, the .NET runtime library). If unzip the "DWToolBox (support T5L instruction set).rar." file package, double-click to open the "DWToolBox.exe" and the program cannot open normally, you need to install the .NET Framework. If "DWToolBox.exe" can be opened normally, there is no need to install the operating environment.

6.2.1 Installation Environment Requirements

Operating system: Windows XP / Windows Vista / Windows 7 / Windows 8 / Windows 10 are all supported.

The user must first know how many bits the computer's system is:

First find the "My Computer" icon, right-click, and select "Properties" in the drop-down options. After clicking the "Properties" button, a dialog box as shown in the figure will pop up, and then you can see whether your system is 32-bit or 64-bit. If 64-bit, X64Edition will be displayed. If not, it proves that the computer is 32-bit.



Of course, some computer system properties will directly indicate the system type:



6.2.2 Installation Steps

Open DWIN's official website, find the operating environment driver to download, or directly ask for the driver from 400 customer service QQ.

	DotNetFx2.0(x64).exe	2013/8/28 14:38	应用程序	46,290 KB
	DotNetfx2.0(x86).exe	2013/8/28 14:36	应用程序	22,960 KB

The user chooses to install according to the corresponding computer system type.

Install DotNetFx2.0(x64).exe, if a 64-bit operating system.

Install DotNetfx2.0(x86).exe , if a 32-bit operating system.

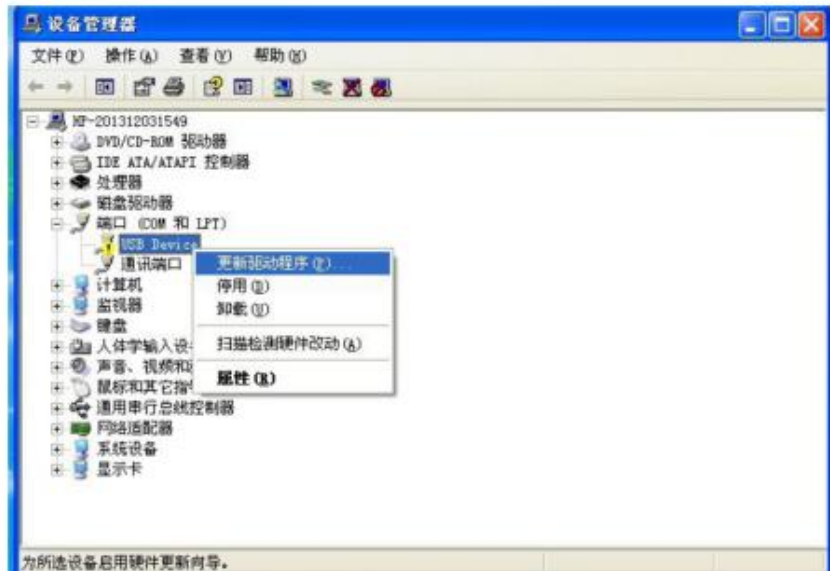
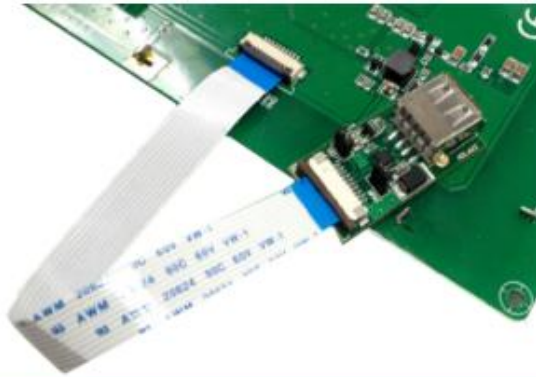
Directly double-click the operating environment driver and click Next to follow the prompts. After the installation is complete, decompress the DWSOFTWARE compression package. No software installation is required. Double-click "DWTToolBox.exe" to run it.

6.3 Hardware Interface Connection and Debugging

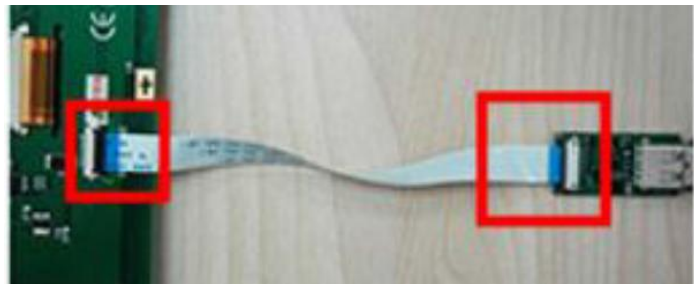
6.3.1 Connect Screen to the Computer

A. 10 Pin 1.0mm fcc interface

Please connect one end of the FPC flexible cable to the terminal block of the serial port screen, and the other end to the DWIN HDL662B adapter board (optional accessories). Need to install XR21V1410XR1410 chip USB driver.



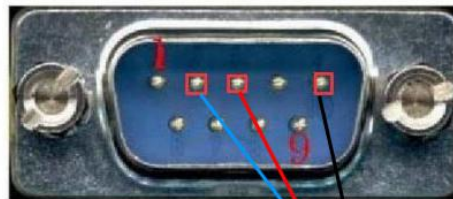
HDL662B adapter board is a small board for USB to TTL communication and power supply. Generally use the opposite side FCC cable To connect with the screen. Please note that the blue end of the cable must be upward. Please short the PWR jumper cap on the USB adapter board. (If the screen is not lit, please check the power supply of the double male USB cable. For example, some USB cables may be too thin to supply power to the screen normally, the screen may be black or flashed.)



8 Pin 2.0mm pitch SMD socket interface

You can choose DWIN's accessory cable HDL65011----8Pin_2.0mm length 20cm cable with DB9 and power interface.

After powering on the screen, the other end is connected to the DB9 head of the computer for RS232 connection. In order to increase the baud rate and facilitate PC debugging, the designed interface is generally TTL/RS232 compatible, and the communication distance should not exceed 50cm.



Pin	Shorthand	Significance
Pin1	CD	Carrier detect
Pin2	RXD	Receive
Pin3	TXD	Transmit
Pin4	DTR	Data terminal preparation
Pin5	GND	Ground
Pin6	DSR	Data ready
Pin7	RTS	Request send
Pin8	CTS	Clear send
Pin9	RI	Ringing indication

RXD receive data: terminal to computer
 TXD text data: computer to terminal
 GND: ground

Communication will perform as RXD, TXD and GND are connected.

6.4 Software Operation Instructions

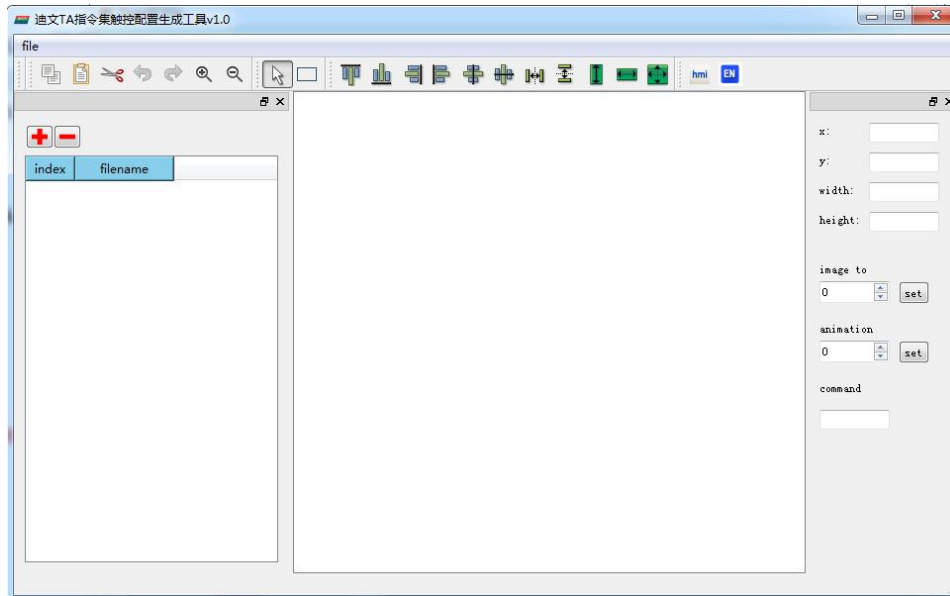
This chapter is based on the description of "DW_TouchConfig.exe, AllToolForAIOT V** .exe".

Software version description

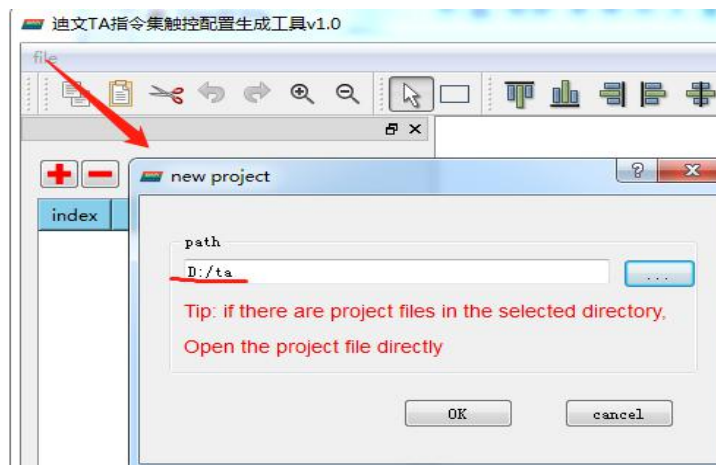
- 1.The "DW_TouchConfig.exe" software function is to make and generate touch configuration files (0x78/0x79 instructions).
- 2.The software function of "AllToolForAIOT V**.exe" is to convert video format files into .LCM format picture/icon library files and .WAE stereo playback format files.

6.4.1 Touch Control Production Software "DW_TouchConfig.exe"

- 1.Double-click to start "DW_TouchConfig.exe", appear the following interface:




- 2.Create a new project: click file → new → select the storage path of the project.

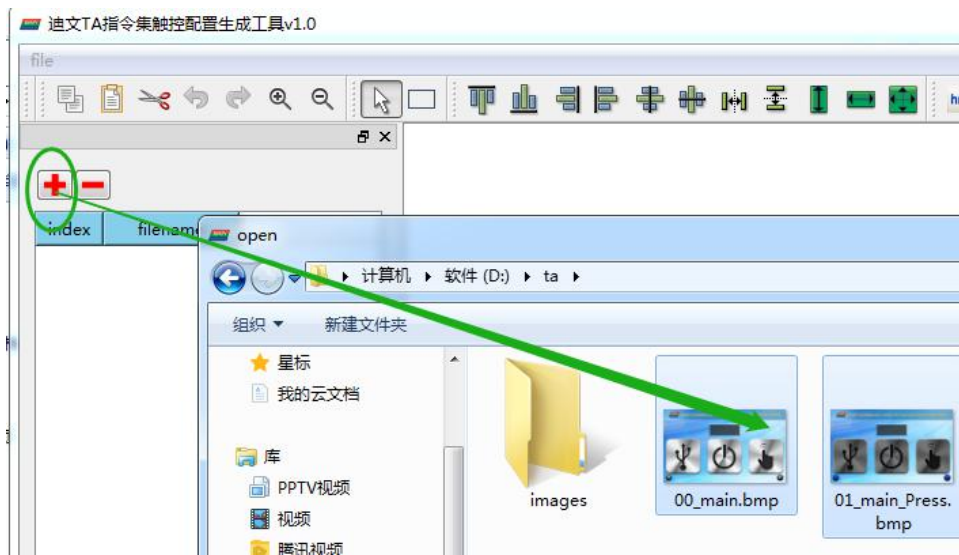


After setting the storage path, click OK to enter the main interface. If a previously used project in the storage path, the system will automatically open the project file in the path, read the size and pixels set in the project file for processing.

3.Add pictures

Click the Add button to add the picture to the project. (When adding pictures, the software will copy the picture files to the \image folder in the project directory for unified management.) Add picture: Click the button  with the mouse to add a picture of the user interface in the software picture bar.

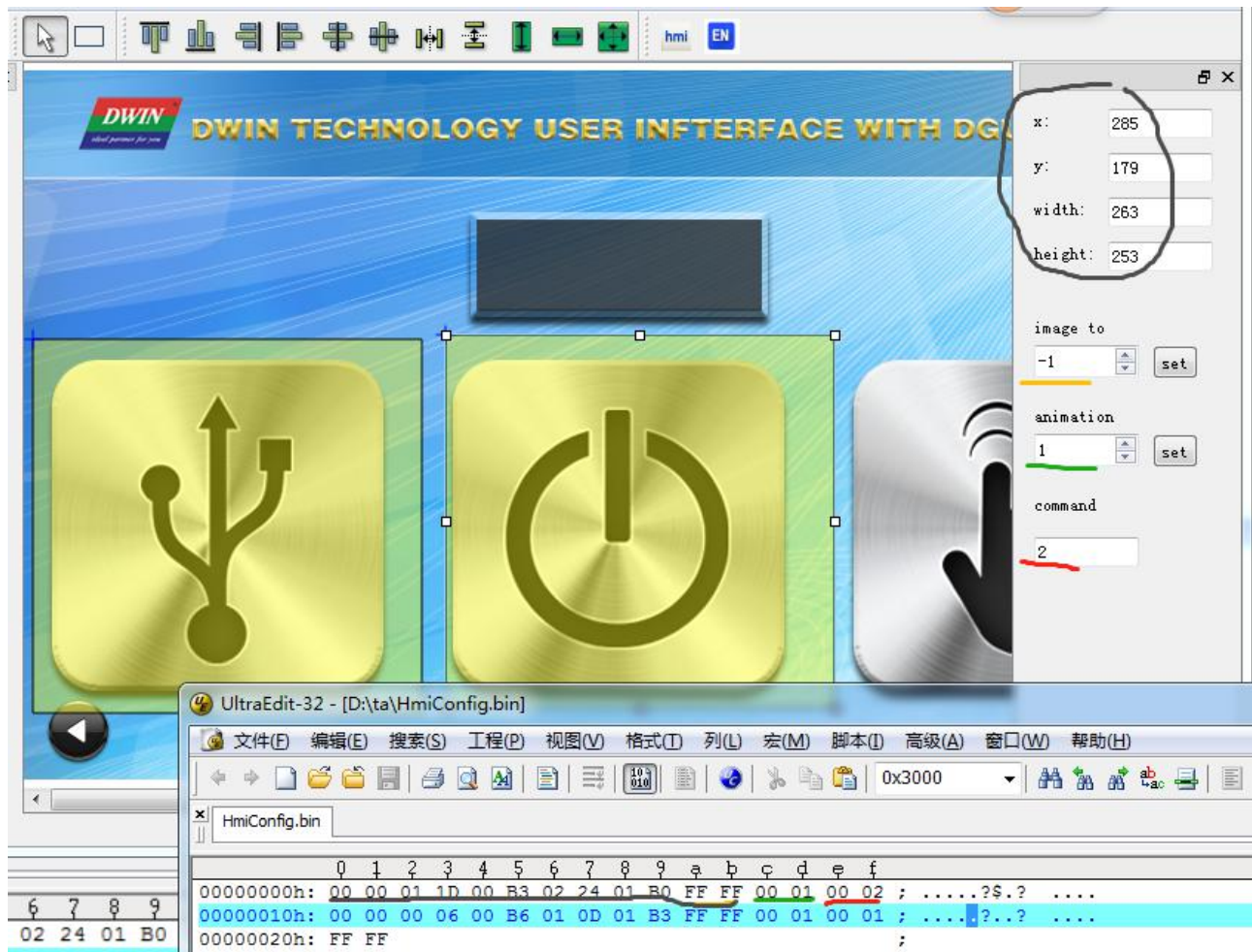
(The picture file can be the same 24-bit color as the screen resolution. BMP/.jpeg/.jpg and other format files. Name begins with Arabic numerals, which indicate the storage location of the picture. Generally, the name starts from the 0 interface such as 00.bmp, 001.bmp, 9.bmp, and other Chinese and English or punctuation can be added after the serial number, such as: 00main.bmp, 01_main interface.bmp.)



4.Each touch command is 16 bytes, defined in the following table:

First address	Length	Definition	Explanation
0x00	2	Pic_Now	The picture number of the current screen, If the high byte of Pic_Now is 0xFF, it means the touch command is over.
0x02	4	Xs,Ys	Coordinates of the upper left corner of the effective touch area
0x06	4	Xe,Ye	The coordinates of the lower right corner of the effective touch area
0x0A	2	Pic_Next	Click the effective touch area to switch to the picture number of the next interface. If the high byte of Pic_Now is 0xFF, it means no interface switching.
0x0C	2	Pic_Cut	After clicking the effective touch area, It automatically cuts the picture number of the button animation effect displayed on the current button area. If the high byte of Pic_Cut is 0xFF, it means that the button animation effect picture is not set.
0x0E	2	Touch_Code	After clicking the effective area of touch (.cfg configuration 0x78/0x79 instruction upload mode), the uploaded touch key code serves as a message to trigger the user's software. If the high byte of Touch_Code

is 0xFF, it means that the touch key code is not uploaded.



Operation and precautions:

1.Make touch file: After dragging an area, you can click the right mouse button to cancel the touch drawing. After selecting touch with the left button, you can click Delete on the keyboard to delete.(Make touch files)

2.Button effect description:

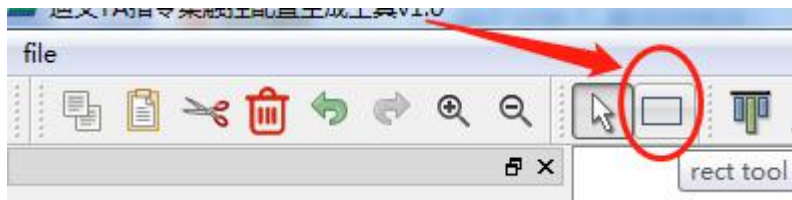
Click a touch button on the screen, and it will change color when press, with a pressing effect.


The principle of the button effect of DWIN screen is to load the image base map of the non-current page corresponding to the same coordinate area of the touch range. The software directly sets the specified page. Refer to the button effect diagram below:

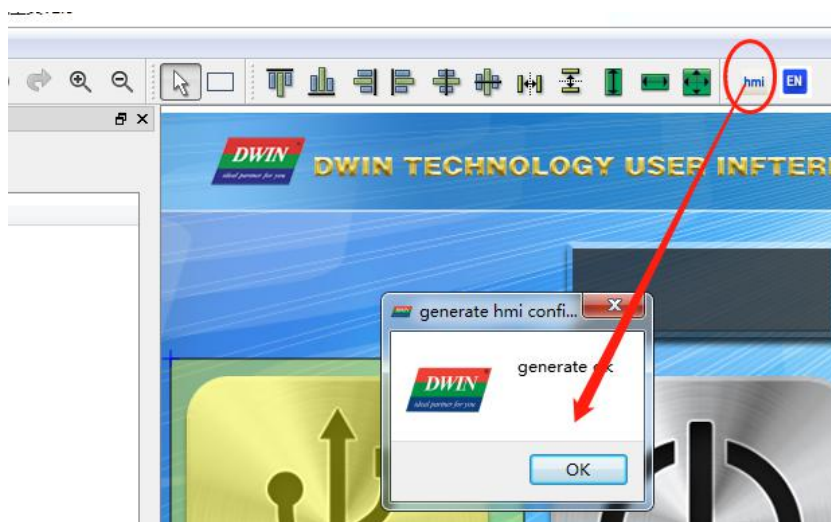


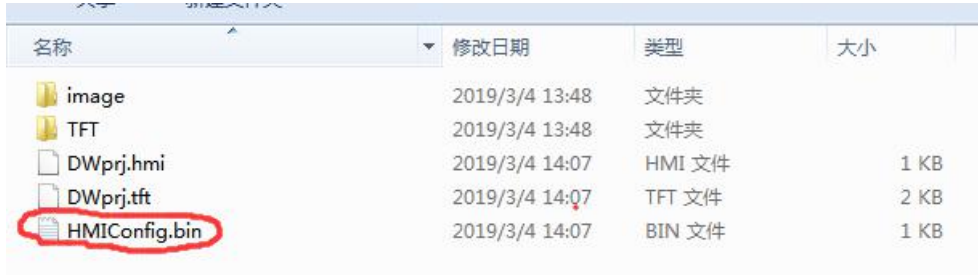
1).The touch buttons to set the touch area is shown below, which is convenient for the user to process various actions when operating the DWIN screen.

Click the button in the figure below to place and set the touch control area.



2) After finishing the touch file, click the button  shown below, the touch file "HmiConfig.bin" will be saved in the root directory of the project path.





名称	修改日期	类型	大小
image	2019/3/4 13:48	文件夹	
TFT	2019/3/4 13:48	文件夹	
DWprj.hmi	2019/3/4 14:07	HMI 文件	1 KB
DWprj.tft	2019/3/4 14:07	TFT 文件	2 KB
HMIconfig.bin	2019/3/4 14:07	BIN 文件	1 KB

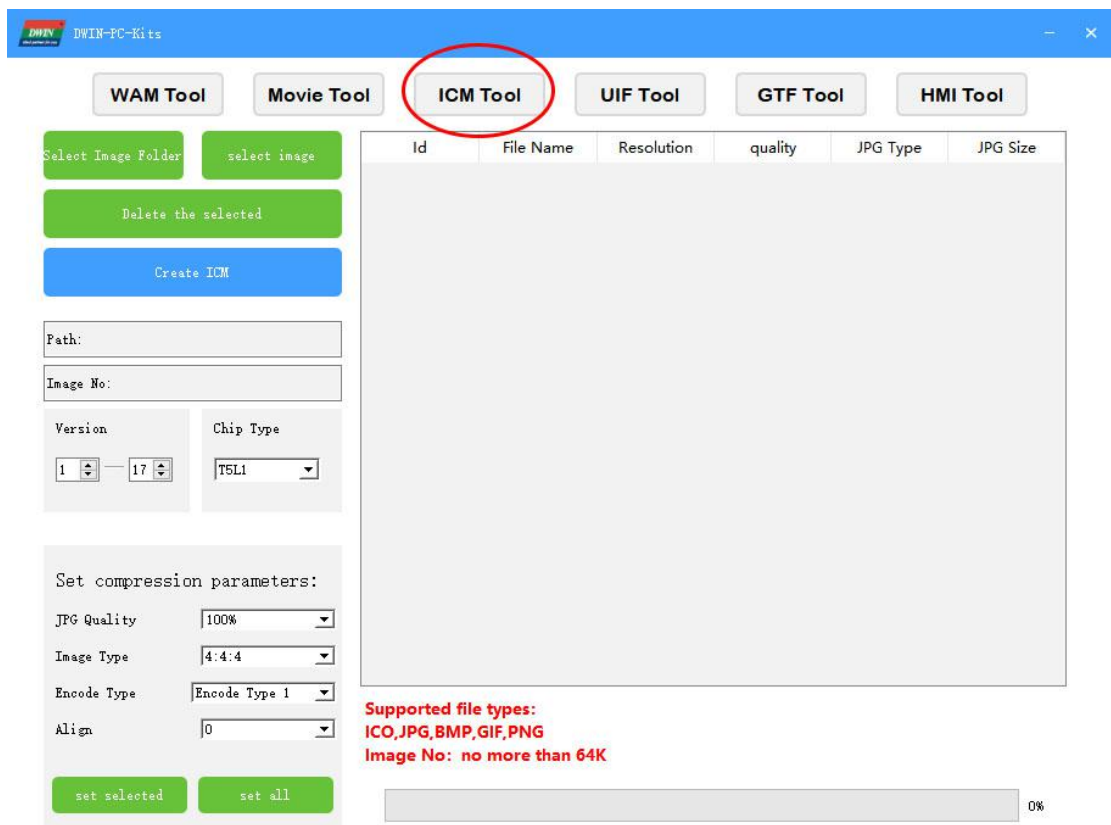
3. Use "UIF Generation Tool" to configure the touch file to load to take effect. (For details, see the chapter of this article: UIF generation tool description)

6.4.2 Picture and Video Processing Software "AllToolForAIOT V**.exe".

6.4.2.1 Convert Background Image Files to .ICM Files

Use the ICM tool shown in the figure below to compress the pictures into .ICM files, that is, compress all background base map files into a collection of picture library files in .jpg format, and give the ICM file a suitable ID location name (*. ICM file naming rules can refer to "Section 2.3 Flash Memory Description").

Pay attention to use "UIF generation tool" to configure the power-on startup page settings, (For details, see the chapter of this article: UIF generation tool description)



7 Download

This chapter mainly explains how to download project files with SD.

7.1 MicroSD (TF) Card Download Format Requirements

All hardware parameter settings and data of the T5L display terminal can be completed through the SD/TF card interface on the screen. The file must be in FAT32 format. The T5L-based serial command screen SD/SDHC interface supports the download and update of the following files, and the update speed is about 3MB/S.

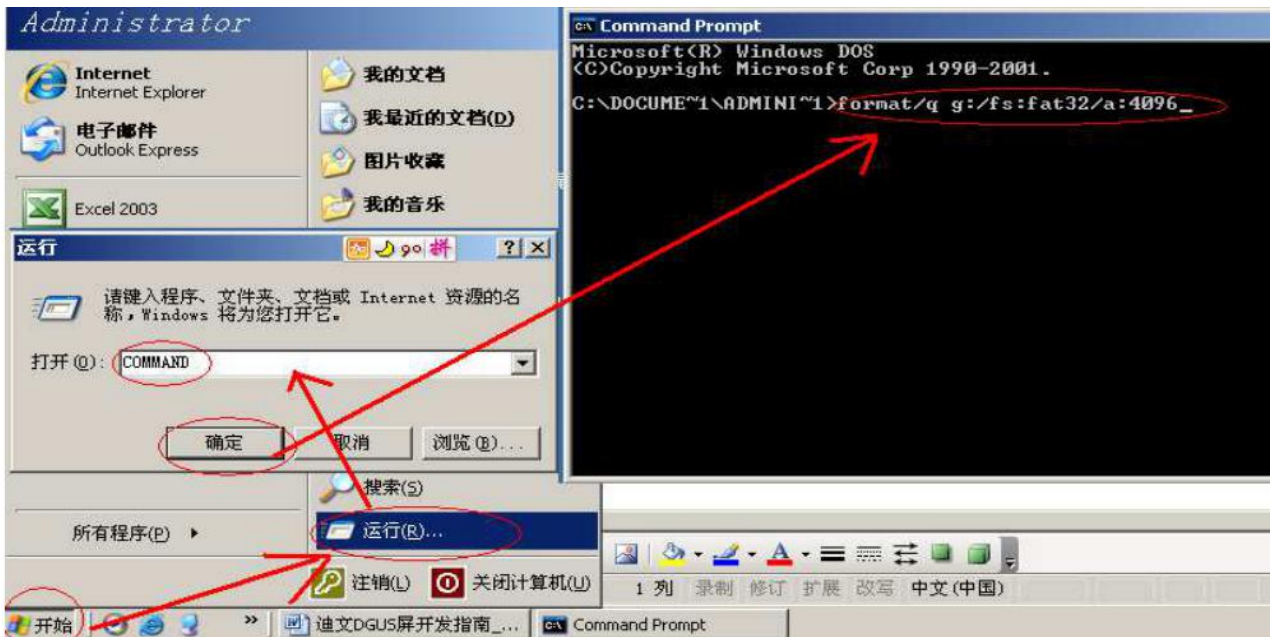
SD cards that are not sold by DWIN’s factory usually have to be formatted under DOS. Otherwise, the downloading phenomenon usually only displays 0 after the blue screen, or the display terminal fails to recognize the card and cannot enter the download interface normally. The formatting operation method is as follows:

Step 1: Start=》 Run=》 Enter command (in win7 system, enter cmd) to enter DOS system;

Step 2: Type the command: format/q g:/fs:fat32/a:4096 (Note: q is followed by a space), and click the Enter button after the input is complete.

Where g is the drive number of the SD card displayed on the user's computer, and the drive letter corresponding to different users is not fixed (for example, replace h, i)

Note: The formatting operation after the right mouse button clicks on the SD card generally cannot be completely formatted to FAT32 format, and generally only supports SD card size range 1-16G.



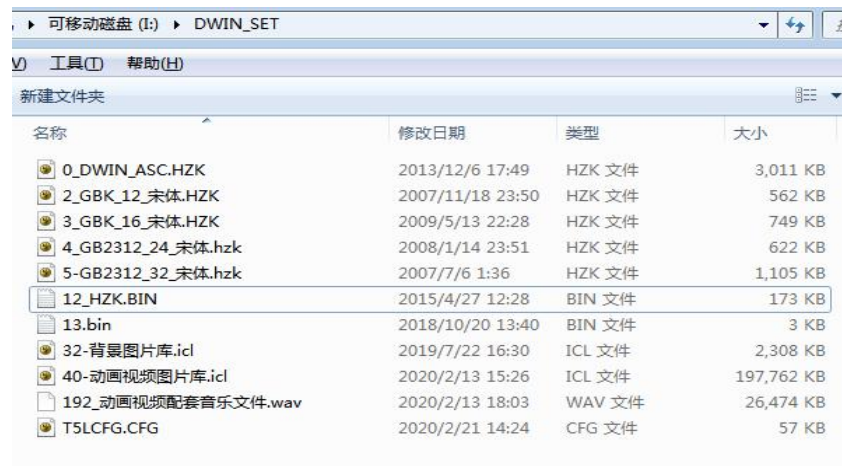
7.2 SD interface Download Process Description

SD card upgrade does not support online hot-swappable update. In order to prevent hot-swapping from affecting Flash operations, you must strictly follow the instructions to power off the screen first, insert the SD card, and then power on to download. During the download process, please ensure to maintain the normal power supply. A power failure in the middle may cause a black screen abnormality.

The process of downloading data using SD card

☆Create a DWIN_SET folder in the root directory of the SD card;

☆Put the pictures to be downloaded...ICM package, font library, configuration file, etc. in the DWIN_SET folder, refer to the following figure:

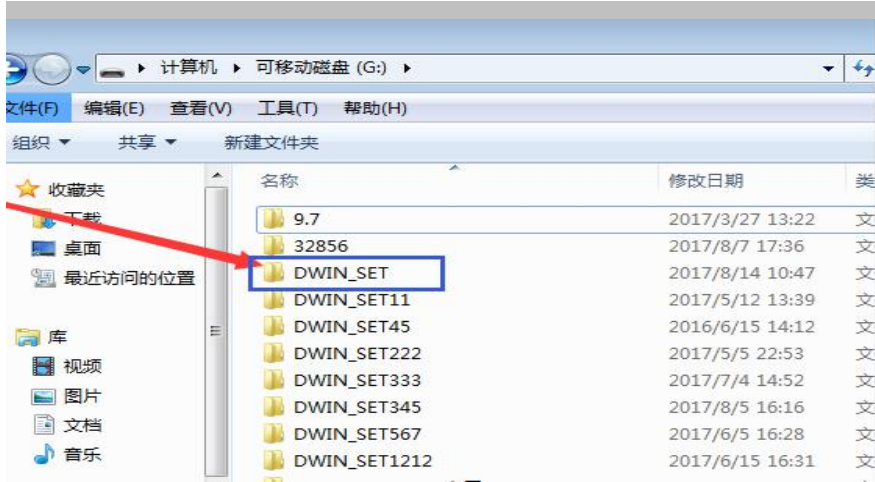


☆When the LCD terminal is powered on and detects that an SD card is inserted, it will identify whether there is a DWIN_SET named file in the root directory of the SD card. If the file name exists in the SD card, the LCD terminal will copy and download the content of the file that meets the format requirements to FLASH.

☆When the blue screen download list prompts that the download is complete, power off the terminal, remove the SD card, and then power on again to enter the normal working mode.

Note that if it is not specially customized or the download encryption function is used, the DWIN standard screen will only recognize the folder name DWIN_SET. Other named folders will not be recognized. The user can also name the folder he wants to back up to another name, and the download will not be affected.

The downloaded file should be named strictly in accordance with the prescribed format, and other related unknown file names may cause unknown underlying errors.



8 Serial Port Instruction set Description

This chapter mainly introduces the instruction set function and usage of AIOT LCM instruction set products.

8.1 Serial Working Mode

DWIN AIOT LCM HMI products all use asynchronous, full-duplex serial ports (UART), the serial port mode is 8n1, that is, each data transmission uses 10 bits: 1 start bit, 8 data bits (low bit before transmission, LSB), 1 stop bit. The factory default baud rate is 115200bps, and the user can modify the system .CFG file to configure the required baud rate.

8.2 Data Frame Structure

The serial data frame of DWIN AIOT LCM consists of 4 data, as shown in the following table:

Data block	1	2	3	4 (when the CRC check code is turned on)	5
For example	0xAA	0x70	0x01	0xB5,0xE0	End of frame
Description	Frame header	Command (1 byte)	Data (max248 bytes)	CRC16 check code (2 bytes)	0xCC 0x33 0xC3 0x3C

Modify the 0x05 position of the .cfg system configuration file. 7=1 to enable CRC check, the CRC check value is calculated from frame header (0xAA), command and data, and placed before the end of frame, for example:

AA 70 00 **74 20** (CRC checksum is the CRC checksum calculated by AA 70 00) CC 33 C3 3C

After the CRC check is enabled, the touch response command will also enable the CRC check, for example: AA 73 00 C8 00 3B **DD F7** CC 33 C3 3C

8.3 Byte Transfer Order

DWIN AIOT LCM command or data are in hexadecimal (HEX) format. For word (2 bytes) data, the high byte is always transmitted first (MSB).

For example, if the x coordinate is 100, its HEX format data is 0x0064, when transmitted to HMI, the transmission sequence is 0x00 0x64.

8.4 Coordinate System

As shown in the figure below, the default coordinate of the first point in the upper left corner of the screen is 0 (0,0), and the coordinates of the lower right corner are based on the resolution of the screen used by the user. For example:

DMG80480L070_01W 7-inch resolution 800x480, the coordinates of the last point in the lower right corner is (800,480).



8.5 Command Quick View Table

NUM.	Command	Data	Function	Command execution time
1	0x00	None	Handshake	NA
	0x00	"OK_V1.0" 0x00 0x00 System_Config PIC_ID	Handshake response. System_Config is the system configuration value configured for the SD/SDHC interface. PIC_ID is the currently displayed picture ID.	
2	0x40	FC,BC	Set the color palette. FC is the foreground color, BC is the background color, which can be 16bit or 24bit.	NA
3	0x41	D_X,D_Y	Set character spacing, D_X is the horizontal spacing, D_Y is the vertical spacing.	NA
4	0x42	(x,y)	Pick color to background color palette	0.35uS/point
5	0x43	(x,y)	Pick color to foreground color palette	0.35uS/point

6	0x54	(x,y),strings	Display 16*16 GBK character string, 3# font	
7	0x55	(x,y),strings	Display 32*32 GB2312 character string, 5# font	
8	0x6E	(x,y),strings	Display 12*12 GBK character string, 2# font	
9	0x6F	(x,y),strings	Display 24*24 GB2312 character string, 4# font	
10	0x98	(x,y),Lib_ID,Mode,Dots,FC,BC,Strings	<p>Specify the format content to display string.</p> <p>Lib_ID:Font ID of 0x00-0x3F.</p> <p>Mode: Display mode. .7=Undefined. .6 1=Background color display 0=Background color not displayed.</p> <p>.5-.4 Undefined.</p> <p>.3-.0 Encoding: 0=8bit 1=GB2312 2=GBK 3=BIG5 4=SJIS 5=UNICODE</p> <p>Dots: Character dot matrix size, For mode 0,mode 5: 00=8*8 01=6*12 02=8*16 03=12*24 04=16*32 05=20*40 06=24*48 07=28*56 08=32*64</p> <p>The 09 corresponding mode under mode0,mode 5 starts from 00 of mode 4: 09(00)=12*12 0A(01)=16*16 0B(02)=24*24 0C(03)=32*32 0D(04)=40*40 0E(05)=48*48 0F(06)=56*56 10(07)=64*64 11(08)=40*80 12(09)=48*96 13(0A)=56*112 14(0B)=64*128 15(0C)=80*80 16(0D)=96*96</p>	0.3ms+0.35uS/point

			17(0E)=112*112 18(0F)=128*128 19(10)=6*8 1A(11)=8*10 1B(12)=8*12 1C(13)=100*200 1D(14)=200*200 1E(15)=48*64 FC: Display text color,2Bytes,5R6G5B mode. BC: The background color of the text,2Bytes,5R6G5B mode.	
11	0x50	(x,y) 0..... (x,y) n	Set point with background color	0.35uS/point
12	0x51	(x,y) 0..... (x,y) n	Set point with foreground color	0.35uS/point
13	0x56	(x,y) 0..... (x,y) n	Foreground endpoint connection	0.35uS/point
14	0x5D	(x,y) 0..... (x,y) n	Background color endpoint connection	0.35uS/point
15	0x75	(x,y),H_Max,H0..... Hi	Display spectrogram	0.35uS/point
16	0x76	X,X-dis, Y0..... Yi	Display line chart	0.35uS/point
17	0x78	(x,y),(dx0,dy0) (dxn,dyn)	Connect by offset	0.35uS/point
18	0x57	(Type,x,y,R)0 (Type,x,y,R) n	Type, display mode: 0x01 =show a hollow circle with the foreground color; 0x03 =show a filled circle with the foreground color. (x,y) is center coordinates,R is radius (0x0001-0x0FFF)	0.35uS/point
19	0x52	None	Clear screen with background	0.9nS/point

			color	
20	0x59	(Xs,Ys,Xe,Ye)0 (Xs,Ys,Xe,Ye)n	Display rectangle with foreground color	0.35uS/point
21	0x69	(Xs,Ys,Xe,Ye)0 (Xs,Ys,Xe,Ye)n	Display rectangle with background color	0.35uS/point
22	0x5A	(Xs,Ys,Xe,Ye)0 (Xs,Ys,Xe,Ye)n	Fill the rectangular area with the background color	0.9nS/point
23	0x5B	(Xs,Ys,Xe,Ye)0 (Xs,Ys,Xe,Ye)n	Fill the rectangular area with the foreground color	0.9nS/point
24	0x64	(Xs,Ys,Xe,Ye),(x,y),Color,Margin	Fill the enclosed area of (x, y) as the seed point with the specified color. (Xs,Ys,Xe,Ye):the outer restricted area of the filled area; (x,y):the seed point position of the area to be filled; Color:fill color,3Bytes,RGB sequence; Margin>Error tolerance of area background color,0x01-0x0F.	0.25uS/point
25	0x5C	(Xs,Ys,Xe,Ye)0 (Xs,Ys,Xe,Ye)n	Inverted designated area	1.7nS/point
26	0x70	PIC_ID	Display full screen picture, background image library file	Read data time+4nS/point
27	0x71	PIC_ID,(Xs,Ys,Xe,Ye),(x,y)	Copy and paste the picture area, background image library file	
28	0x7D	Mode,PIC_ID	Fancy picture switching, Mode=0x00-0x08 9 kinds of fancy. PIC_ID must be a two-byte encoding mode	0.5s
29	0x96	(X,Y),QR_Pixel,DATA	QR code display. (X, y) is the coordinate position displayed by the QR code. QR_Pixel: the size of pixels occupied by each point of the QR code,0x01-0x0F; DATA:display data.Data within 155 bytes is displayed with 45*45 dots QR code, and data above 155 bytes is	3mS or 10mS

			displayed with 73*73 dots QR code.	
30	0x97	(X,Y),Lib_ID,Mode,ICON_IDO..... ICON_Idn	Icon display. Lib_ID :Icon library file ID Mode=0x00 Filter out background, Other = display background	5nS/point
31	0x79	BZ_Time	Buzzer BZ_Time*10mS	NA
32	0x5E	None	Backlight off	NA
33	0x5F	PWM_T	Backlight brightness adjustment, PWM_T range 0x00-0x40	NA
34	0xC0	ADR_H:L(0x000-0xFFFF)+DATA	Write data buffer, Double word alignment,4 bytes per address	NA
35	0xC2	ADR_H:L(0x000-0xFFFF)+Len(0x0001-0x003C)	Read Len double word length data from temporary storage buffer, Len range 0x0001-0x003C.	NA
		Reply: ADL_H:L+Read_Data		
36	0xFF	0x01	After enabling the CRC check, if the CRC check is not correct, answer this command.	NA
Touch panel actively uploads commands				
01	0x72	(x,y)	Upload the coordinate position during the touch panel raised.	
02	0x73	(x,y)	Upload the coordinate position during the touch panel press.	
03	0x78	<Touch_Code)	Upload the touch key code during the touch panel raised, 13.UIF configuration file.	
04	0x79	<Touch_Code)	Upload the touch key code during touch panel press, 13.UIF configuration file	

Remarks:

(1) The CPU frequency corresponding to the execution time of the above table is 353.8944MHz.

(2) Actual display time = command execution time * display area size, for example:

The character display execution time is 0.3ms+0.35uS/point. For 32*32 dot matrix Chinese characters, the single character display time=0.3+0.35*32*32/1000=0.66mS.

The execution time of picture display is read data time +4nS/point. For 800*600 resolution pictures, single picture display time:

Assuming that the JPEG image is 256KB, the data reading rate is 35MB/S, the data reading time = 7.14mS;

Decompression display time=800*600*4nS=1.92mS. The whole time is 7.14+1.92=9.06mS;

(3) For more detailed command description, please refer to "DWIN HMI (Industrial Serial Screen) Command Set".

8.6 Partial Command Function Description and Application

All commands in the following table are abbreviated as hexadecimal data for the convenience of writing and reading (for example, 0x4F is abbreviated as 4F).

8.6.1 Handshake Command

Command sending format	AA 00 CC 33 C3 3C
Command return format	AA 00 4F 4B 5F 56 31 2E 30 00 00 48 00 01 CC 33 C3 3C
Parameter Description	None
Command application	<p>1、 When using the display terminal, due to the inconsistent startup time of the control system and the display terminal (depending on the user's power capacity and power-on rate), to ensure that the data sent by the control system at the beginning of the display terminal can correctly receive and perform the corresponding functions and commands, so you need to confirm whether the display terminal is already in normal operation, and the user can confirm through the handshake command;</p> <p>2、 When need to know whether the system version, configuration, etc. are correct during debugging, you can also send a handshake command to read.</p> <p>3、 The sending and response of handshake commands are often used to verify whether the communication between the computer serial port and the serial port screen is normal.</p>

8.6.2 Set the Current Palette

Send format	AA 40 <FC> <BC> CC 33 C3 3C			
Example	AA 40 F800 001F CC 33 C3 3C 或 AA 40 FF0000 0000FF CC 33 C3 3C			
Return format	None			
Parameter Description	<table border="0"> <tr> <td>FC is the foreground color, the default value is white</td> <td rowspan="2">It can be 16bit or 24bit, for example, 24-bit RGB red is represented as FF0000, and 16-bit RGB red is represented as F800</td> </tr> <tr> <td>BC is the background color, the default value is blue</td> </tr> </table>	FC is the foreground color, the default value is white	It can be 16bit or 24bit, for example, 24-bit RGB red is represented as FF0000, and 16-bit RGB red is represented as F800	BC is the background color, the default value is blue
FC is the foreground color, the default value is white	It can be 16bit or 24bit, for example, 24-bit RGB red is represented as FF0000, and 16-bit RGB red is represented as F800			
BC is the background color, the default value is blue				



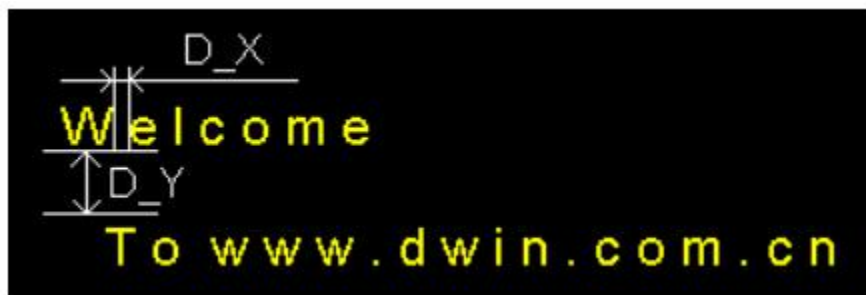
Command application	This instruction is applicable to 43, 54, 55, 6E, 6F instructions to directly call the fixed position of the Chinese character library display. At the same time, it is necessary to configure the .cfg configuration file 05 address. 4=0 The background color of the text display is not automatically restored. Once set, unless reset, it will be saved until the display terminal hardware is reset and the default value is restored. If the user needs to use the background color block to display the text, the microcontroller can send the initialization command packet to set the 40 commands.
---------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

8.6.3 Clear the Screen

Send format	AA 52 CC 33 C3 3C
Example	AA 40 00 00 F8 00 CC 33 C3 3C + AA 52 CC 33 C3 3C
Return format	None
Command application	Use 40 commands to set the background color to fill the full screen (clear the screen). The different colors of the clear screen can be used to detect whether the screen has abnormal dead pixels and other liquid crystal display abnormalities.

8.6.4 Set Character Display Spacing

Send format	AA 41 <D_X> <D_Y> CC 33 C3 3C
Example	AA 41 10 10 CC 33 C3 3C
Return format	None
Parameter	<D_X> is the character spacing in the x direction, the value range is 0x00-0x7F, and the default value is 00.
Description	<D_Y> is the character spacing in the y direction, the value range is 0x00-0x7F, and the default value is 00.



Command application	This command is applicable to commands 43, 54, 55, 6E, 6F, 98, used to directly call the font character display, also used to instruct to adjust the display character spacing. Once set, unless reset, it will be saved until after the display terminal hardware is reset, the default value is restored.
---------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

8.6.5 Take the Specified Position Color

Send format	AA <CMD> <X> <Y> CC 33 C3 3C
Example	AA 42 0064 0064 CC 33 C3 3C

Return format	None
Parameter Description	<p>CMD 42 is to take the color from the specified position to the background color palette; 43 is to take the color from the specified position to the foreground color palette</p> <p><X> is the coordinate point in the x direction</p> <p><Y> is the coordinate point in the y direction</p>
Command application	The same as 40 set current palette command application

8.6.6 Factory Pre-installed Standard Font Display

Send format	AA <CMD> <X> <Y> <String> CC 33 C3 3C
Example	AA 55 0080 0030 48 6F 77 20 61 72 65 20 79 6F 75 20 3F CC 33 C3 3C
Return format	None
Parameter Description	<p>CMD :</p> <p>54 Display 16*16 GBK character string, 3# font.</p> <p>55 Display 32*32 GB2312 character string, 5# font.</p> <p>6E Display 12*12 GBK character string, 2# font.</p> <p>6F Display 24*24 GB2312 character string, 4# font.</p> <p><X> <Y> Display the starting position of the string (the coordinate position of the upper left corner of the first character), in the example, it means to display from the position (128,48)</p> <p><String> The character string to be displayed, Chinese characters adopt GB2312 (55, 6F command) internal code; or GBK (54, 6e command) internal code extended coding, the color can be set by 40 commands, and the display character spacing is set by 41 commands. It will automatically wrap at the end of the line, and 0x0D and 0x0A will be processed into carriage return and line feed "" in the example string character ASCII code "How are you?".</p>

8.6.7 Specify the Format Content to Display String (Select font to display)

Send format	AA 98 <x,y> <Lib_ID> <Mode> <Dots> <FC> <BC> <Strings> 0003 CC 33 C3 3C
Example	AA 98 00 64 00 64 1A 41 02 F8 00 00 1F 31 32 B1 B1 CC 33 C3 3C At (100,100) to Display 26# font, 24*24 dot matrix, GB2312, foreground color red, background color blue, "12 north"
Return format	None
Parameter Description	<p>PIC_ID: The serial number of the picture stored in the .ICM of the background picture. Sending a page display operation without a serial number will not switch the page.</p> <p><x, y> Display the starting position of the string (the coordinate position of the upper left corner of the first character)</p> <p><Lib_ID> font selection, value range 0x00-0x3f</p> <p><Mode> select the text display mode and encoding method, as shown in the following table</p>

	Bit	.7~.4 high four bits	.3~.0 low four bits
	Definition	Whether to display the background color in the display mode configuration (this mode will be effective only when the CFG configuration 05 address.4=0 does not automatically restore the settings, otherwise the background color will be restored by default)	Character encoding
	Description	.7=Undefined. .6 =1 background color display; =0 background color not display. .5-.4 Undefined.	0=8bit 1=GB2312 2=GBK 3=BIG5 4=SJIS 5=UNICODE
	<Dots> Character dot matrix size, for mode 0 and mode 5:		The dot matrix after 09 in modes 0 and 5 corresponds to the dot matrix starting from 00 in mode 1-4:
	00=8*8 01=6*12 02=8*16 03=12*24 04=16*32 05=20*40 06=24*48 07=28*56 08=32*64	09(00)=12*12 0A(01)=16*16 0B(02)=24*24 0C(03)=32*32 0D(04)=40*40 0E(05)=48*48 0F(06)=56*56 10(07)=64*64 11(08)=40*80 12(09)=48*96 13(0A)=56*112	14(0B)=64*128 15(0C)=80*80 16(0D)=96*96 17(0E)=112*112 18(0F)=128*128 19(10)=6*8 1A(11)=8*10 1B(12)=8*12 1C(13)=100*200 1D(14)=200*200 1E(15)=48*64
	<FC>: Display text color, 2Bytes, 5R6G5B mode.		
	<BC>: The background color of the text, 2Bytes, 5R6G5B mode.		
Command application	98 command is usually used with 71 cut command. In addition to calling the factory-installed font display, it is generally used to call user-defined fonts. It is often used to display Unicode font codes and display characters in multiple languages. AA 98 00 64 00 64 32 45 07 F8 00 00 1F 00 31 00 32 00 77 CC 33 C3 3C For example, the encoding method for displaying (100,100) 50 font ID position is unicode 28X56 dot matrix character "12w".		

8.6.8 Full Screen Picture Display

Send format	AA 70 <PIC_ID> CC 33 C3 3C
Example	AA 70 01 CC 33 C3 3C Display the first picture saved in HMI, Or AA 70 00 01 CC 33 C3 3C displays the first picture saved in HMI,
Return format	None
Parameter Description	PIC_ID: The serial number of the picture stored in the .ICM of the background picture. Sending a page display operation without a serial number will not switch the page.

8.6.9 Cut Icon Display

Send format	AA 71 <PIC_ID> <Xs> <Ys> <Xe> <Ye> <X> <Y> CC 33 C3 3C
Example	AA 71 08 01 90 00 00 03 1F 01 90 00 C8 00 14 CC 33 C3 3C Cut the (400,0) (799,400) area of the eighth picture and display it to the current screen position (200,20).
Return format	None

Parameter Description	<p>PIC_ID: The serial number of the picture stored in the .ICM of the background picture. Sending a page display operation without a serial number will not switch the page.</p> <p><Xs> <Ys> <Xe> <Ye> The area of the front cut area, the upper left corner coordinate and the lower right corner coordinate</p> <p><X> <Y> The display position of the cut image on the current screen</p>
Command application	Copy and paste picture area, background picture library file. It is often used to cut a small area of the current page and refresh the text display in the current position area, that is, the 71+98 command is used in conjunction.

8.6.10 .ICM Icon Display

Send format	AA 97 <X,Y> <Lib_ID> <Mode> <ICON_ID0... ICON_IDn> CC 33 C3 3C
Example	AA 97 00 64 00 64 32 00 0001 0002 CC 33 C3 3C calls the serial number 1 and 2 icon files in the font library 50.. ICM icon, and the background color is filtered and displayed on the screen (100, 100)
Return format	None
Parameter Description	<p><X,Y> The coordinate position of the first icon displayed, the subsequent icons will automatically calculate the coordinates, the interval between icons is determined by the Dis_X set by the 41 command, that is, the second icon position = X + icon width + Dis_X.</p> <p><Lib_ID> *. The font location where the ICM icon file is saved</p> <p><Mode>Background color selection, 00=filter background (filter the same color as the first pixel in the upper left corner of the entire small icon picture), other=display background</p> <p><ICON_ID0...ICON_IDn> The index ID of the small icon to be displayed in the .ICM file, each ID is two bytes, 0x0000-0xFFFF</p>
Command application	It is mainly used to solve the problems of 71 command to cut small picture area on the picture, which requires manual alignment and cannot filter the background color. When making the .ICM icon library, the small picture material format must be a JPG format picture and the size should not exceed 1023*1023 resolution.

8.6.11 Fancy Picture Switching

Send format	AA 7D <Mode> <PIC_ID> CC 33 C3 3C
Example	AA 7D 01 0002 CC 33 C3 3C
Return format	None
Parameter Description	<p>Mode: =0x00-0x08, 9 kinds of fancy styles, respectively from the center→two sides, diagonal→diagonal, up→down, left→right, etc. 9 kinds of picture fancy switching.</p> <p>PIC_ID: The ID of the picture to be switched (double bytes), which cannot be used to refresh the display of the current page.</p>
Command application	The display time of this instruction is 0.5S, refreshment is extremely smooth, and it is a new instruction added compared with the old version instruction set products. It can bring a cooler visual experience to the user's terminal display.

8.6.12 Buzzer Control

Send format	AA 79 <BZ_Time> CC 33 C3 3C
Example	AA 79 64 CC 33 C3 3C
Return format	None
Parameter	BZ_Time 0x01-0xFF The length of time for the buzzer to sound, the unit is 10mS.

Description	
Command application	The buzzer "di" can be used for warning. For example, it can be used for power-on initialization to complete the prompt tone operation in the last step.

8.6.13 Backlight Control

Send format	AA <CMD> <PIC_ID> CC 33 C3 3C
Example	AA 5E 0002 CC 33 C3 3C ;AA 5F 0002 CC 33 C3 3C
Return format	None
Parameter	<CMD>5E backlight off
Description	<CMD>5F backlight on
Command application	In order to prolong the service life of the LCD, you can turn off the backlight when the touch panel is idle for a long time without being touched.

8.6.14 Backlight Brightness Adjustment

Send format	AA 5F <PWM_T> CC 33 C3 3C
Example	AA 5F 20 CC 33 C3 3C
Return format	None
Parameter	<PWM_T> Backlight brightness adjustment, range 0x00-0x40.
Description	
Command application	You can directly use the 5F command to adjust the backlight to the minimum. Turn off the backlight AA 5F 00 CC 33 C3 3C

8.6.15 QR Code Display

Command format TX	AA 96 00 64 00 64 04 68 74 74 70 3A 2F 2F 77 77 77 2E 64 77 69 6E 2E 63 6F 6D 2E 63 6E 2F CC 33 C3 3C
Command return format	None
Parameter	(x, y): the coordinate position displayed by the QR code (100, 100)
Description	QR_Pixel: each point of the QR code occupies the pixel size 0x01-0x0F; DATA: 45*45 dot QR for displaying data within 155 bytes http://www.DWIN.com.cn/



Command application	The display of the dynamic QR code bid farewell to the old version of the instruction set that can only be displayed with a fixed picture. The commands that users need to send only need to send coordinates, size, ASCII code or Chinese character internal code.
---------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

8.6.16 Set point, Connection Display

Send format	AA <CMD> (x,y) 0 ... (x,y) n CC 33 C3 3C	
Example	AA 51 0000 0000 0003 0006 0005 0020 CC 33 C3 3C display point with foreground color (set point)	
Return format	None	
Parameter Description	<CMD>	50 background color point. 51 Foreground color point. 56 Foreground color endpoint connection. 5D background color endpoint connection.
	(x,y) 0 ... (x,y) n	Point coordinates to be displayed, one serial port data can display up to 62 points
Command application	56 command are also used to draw polygons	

8.6.17 Rectangle, Area Inverted Color, etc. Display

Send format	AA <CMD> (Xs,Ys,Xe,Ye) 0... (Xs,Ys,Xe,Ye) n CC 33 C3 3C	
Example	AA 59 00 01 00 02 00 65 00 66 CC 33 C3 3C draw a rectangle in the coordinate area (1,2)~(101,102):	
Return format	None	
Parameter Description	<CMD>	59 The foreground color shows a rectangle. 69 The background color shows the rectangle. 5A The background color fills the rectangular area. 5B The foreground color fills the rectangular area. 5C Invert the designated area.
	(Xs,Ys,Xe,Ye) 0... (Xs,Ys,Xe,Ye) n	The coordinates of the upper left corner and the lower right corner of the rectangular area. One instruction can perform the same type of instruction operations on multiple different areas in sequence.
Command application	The rectangle fill command is often used to display a rectangular progress bar, or as a fill area consistent with the background color base map for text refresh coverage.	

8.6.18 Touch Panel Operation 78/79 Command

Send format	AA <CMD> <Touch_Code> CC 33 C3 3C
Example	AA 78 00 10 CC 33 C3 3C AA 79 00 10 CC 33 C3 3C When the touch panel is pressed, the HMI will automatically upload the mode with the 78/79 command configured at the 0x05 position of the T5LCFG*.CFG hardware configuration (the key value of the command touch setting in this example is 0010).You can set whether uploading data or not while pressing the touch panel.
Return format	None

Parameter	<CMD>	78 Touch the uploaded key value for the first time
Description		79 Touch and keep pressing the uploaded key value (can be closed by cfg file configuration)
	<Touch_Code>	Configured touch 13. Button key value added in UIF file
Command application	78/79 commands can add button effects from touch file and base map configuration. Usually 79 command is often used for incremental adjustment and jog control applications.	

8.6.19 72/73 Command for Touch Panel Operation

Send format	AA <CMD> <X,Y> CC 33 C3 3C	
Example	<p>AA 73 00 64 00 64 CC 33 C3 3C</p> <p>AA 72 00 64 00 64 CC 33 C3 3C</p> <p>When the touch panel is pressed, the HMI will automatically use the 72/73 command configured at 0x05 of the T5LCFG*.CFG hardware configuration to upload mode (the button coordinate of the example command touch setting is (100, 100). You can set whether uploading data or not while pressing the touch panel.</p>	
Return format	None	
Parameter	<CMD>	73 Upload when pressing the touch panel, upload once or keep pressing to upload.
Description		72 Upload when the touch panel is released (can be closed by cfg file configuration)
	<X,Y>	The coordinate position of the touch and press corresponds to the resolution of the screen. Please refer to the description of 5.4 Coordinate System.
Command application	The 72/73 command only needs to be uploaded in coordinate mode according to the user's touch position. No need to make 13.UIF touch file. It is not possible to add button effects from the touch file and base map configuration.	

If user has reassembled the touch screen, or damaged the touch screen due to other interference reasons, physical application environment, etc., it will cause the touch screen coordinates to be inaccurate and malfunction. The touch panel has been configured for touch calibration in the factory, and users generally do not need to calibrate the touch panel.

9 Data Buffer Command Set Description

The 256Kbytes data buffer is read and written as double words (4 bytes per address), and the address range is 0x0000-0xFFFF, which can be accessed using 0xC0 write/0xC2 read instructions. The first 16KB (address range 0x0000-0x0FFF) is the system variable control interface, which is defined as follows (the user can also use the 8051 program written by keil software to address and access (the double word length defines the address), for details, please refer to "DWIN T5L ASIC Application Development Guide "Variable Storage Instructions):

Address	Double word length	Definition	Description (The commands listed in the following table are all without CRC check)
0x0000	32	Hardware configuration information	The first 128 bytes of the .CFG file. (read only)
0x0020	1	Currently displayed page ID	D00:D01= Currently displayed page ID For example: Send: AA C2 0020 0001 cc33c33c Answer: AA C2 00 20 00 02 00 00 CC 33 C3 3C Where 0001 is the current page ID number
0x0021	1	Drawing configuration	D00=Pixel size of drawing,0x01-0xFF,Reset value is 0x01; D01=D_X D02=D_Y ,Character spacing,0x41 command set, Reset value is 0x00; D03 Unused, write 0x00.
0x0022	1	Foreground color	D00=RED D01=GREEN D02=BLUE D03 0x40 0x43 command can be changed. Reset value is 0xFF FF FF 00, white.
0x0023	1	Background color	D00=RED D01=GREEN D02=BLUE D03 0x40、 0x42 command can be changed. Reset value is 0x00 00 FF 00, blue.
0x0024	2	TP trigger information	D00=0x5A means there is a touch panel trigger, cleared after OS CPU processing; D01=Touch panel command data length. The touch mode is 0x02,the coordinate mode is 0x04; D02=Reserved, write 0x00; D03=Touch panel command; D04:D07=Touch panel data. Example 1、 (Such as opening the 78/79 command upload mode): Touch response: AA 78 00 04 CC 33 C3 3C or AA 79 00 04 CC 33 C3 3C Send: AA C2 0024 0002 CC 33 C3 3C Answer: AA C2 0024 0002 0078 0004 00 00 CC 33 C3 3C or AA C2 0024 0002 0079 0004 00 00 CC 33 C3 3C Example 2、 (Such as enabling 72/73 command upload mode): Touch response: AA 73 00 64 00 64 CC 33 C3 3C or AA 72 00 64 00 64 CC 33 C3 3C Send: AA C2 0024 0002 CC 33 C3 3C Answer: AA C2 00 24 00 04 00 73 00 64 00 64 CC 33 C3 3C or AA C2 00 24 00 04 00 72 00 64 00 64 CC 33 C3 3C

0x0026	2	RTC read information	D00=0x5A means RTC has been updated D01=year D02=month D03=day D04=week D05=hour D06=minute D07=second.
0x0028	2	RTC configuration information	D00=0x5A starts one-time RTC configuration, and T5L is cleared after the configuration is completed. D01=year D02=month D03=day D04 undefined D05=hour D06=minute D07=second. Example: AA C0 0028 5A14 021B 0014 0B0A CC33C33C Here is the combination of changing the RTC time to 2020-02-27 20:11:10 and the "RTC overlay display control" function.
0x002A	4	JPEG image display	Display the JPEG image in the data buffer to the specified position on the current interface. D00=0x5A start one-time JPEG image display, cleared after T5L processing; D01:undefined,write 0x00; D02:D03=The first address of the JPEG data stored in the data buffer; JPEG data needs to be stored in reverse order of double words in the data buffer. For example, the normal storage data 0x01 0x02 0x03 0x04, when using the 0xC0 command to write, it should be written in accordance with 0x04 0x03 0x02 0x01. D04:D7=The position of the JPEG image displayed on the screen (x, y); D08:D09=The window size of the JPEG image displayed on the screen, the number of horizontal dots; D10:D11=The window size of the JPEG image displayed on the screen, the number of vertical dots. D12-D15:Undefined, write 0x00. For example: AA C0 002A 5A00 1000 0010 0010 0200 0200 CC33C33C
0x002E	2	Reservation	Write 0x00.
0x0030	7	RTC superimposed display control	Superimpose RTC on the current page. D00=0x5A enable RTC superimposed display; D01=Display font size, vertical dot matrix number; D02=Font library location,0x00 or other ASCII code font specified by user; D03:D05=Character display color, R:G:B; D06-D08=character background color, R:G:B; D09-D12: display coordinate position (x, y); D13-D27: RTC display code string: Y means year, M means month, D means day, W means week; H means hour, Q means minute, S means second, and 0x00 means end of encoding. For example, the display format of Y-M-D W H:Q:S 0x00 is 2020-02-01 SAT 12:00:00. For example: AA C0 0030 5A1000 FFFFFFFF 000000 0010 0010 592D4D2D 4420483A513A5320 570000 CC33C33C
0x0037	41	Reservation	Write 0x00.
0x0060	4	Stereo music playback	Play 16bit, WAV format (stereo or mono) music. D00=0x5A starts one-time music playback processing, cleared after T5L processing; D01=Play mode: 0x00=stop, 0x01=start playing from the specified position, 0x02=pause/play; D02:D03=music start position, second; D04:D05=Played music WAM file ID; The file ID exceeds 32767, means the file with the corresponding serial number stored in the root directory of the SD card. D06:D07=The segment ID of the played music in the WAM file;

			<p>D08:D09 Reservation, write 0x00;</p> <p>D10:D11=Volume, 0x0000-0xFFFF,Unit 1/256.</p> <p>D12:D15 Reservation, write 0x00.</p> <p>For example: AAC0 0060 5A01 0000 00C0 0000 0000 0100 0000 0000 CC33C33C</p>
0x0064	5	Video playback	<p>Play the ICM icon (picture) into a video with animation.</p> <p>D00=0x5A starts an video playback, clears after T5L processing;</p> <p>D01= Play mode:</p> <p>0x00=stop, 0x01=start playing from the specified position, 0x02=pause/play;</p> <p>D02=Playing speed, frame/sec, 0x18 is 24 frames/sec, the minimum is 12 frames/sec;</p> <p>0x00 means use the frame rate defined by the ICM file to play.</p> <p>D03=Video and audio synchronization setting. Write 0x5A to turn on the audio and video synchronization during pause/play;</p> <p>D04:D05=Start position of video playback, in seconds;</p> <p>D06:D07=The ID of the ICM file saved in the video;</p> <p>0x00 means use the frame rate defined by the ICM file to play.</p> <p>D03=Video and audio synchronization setting. Write 0x5A to turn on the audio and video synchronization during pause/play;</p> <p>D04:D05=Start position of video playback, in seconds;</p> <p>D06:D07=The ID of the ICM file saved in the video;</p> <p>The file ID exceeds 32767, means the file with the corresponding serial number stored in the root directory of the SD card.</p> <p>The ICM file must be generated in 64KB alignment mode.</p> <p>D08:D11=The coordinate position of the upper left corner of the video display content (x, y);</p> <p>D12:D15=The position displayed on the screen (x, y);</p> <p>D16:D17=The size of the window displayed on the screen, the number of horizontal dots;</p> <p>D18:D19=The size of the window displayed on the screen, the number of vertical dots.</p> <p>For example:</p> <p>AAC0 0064 5A01 185A 0000 0020 0000 0000 0000 0000 0400 0258 CC33C33C</p>
0x0069	2	Audio and video playback progress feedback	<p>D00:D01=audio playback progress, where D00=minutes, D01=seconds.</p> <p>D02:D03=Video playback progress, where D02=minutes, D03=seconds.</p> <p>D04:D05=Total length of current audio playback, where D04=minutes, D05=seconds.</p> <p>D06:D07=Total length of current video playback, where D06=minutes, D07=seconds.</p> <p>Example:</p> <p>AA C2 00 69 0002 38 CC 33 C3 3C</p>
0x006B	2	NAND Flash operation interface	<p>D00=0x5A starts a NAND Flash operation and clears after T5L processing.</p> <p>D01=Operation mode,</p> <p>0x01: Data buffer 4KB data is written into NAND Flash;</p> <p>0x02: Read 4KB Flash data to the data buffer. Only 192# font and later (corresponding to the start address 0x1800:0000) NAND Flash data can be read. (Address calculation formula:192x2x1024x1024)</p> <p>0x04: Font library Copy.</p> <p>For 0x01, 0x02 mode:</p> <p>D02:D03=Data buffer address pointer, 0x1000-0xF000.</p> <p>D04:D07=NAND Flash address, 4KB alignment is required (the lower 12bit of the address is 0).</p>

			<p>Flash is managed according to 256KB blocks, and each 256KB block is divided into 64 4KB blocks; any 4KB data block can be read arbitrarily when reading;</p> <p>When writing, when writing the first 4KB block of the 256KB block (the lower 18bit of the Flash address is 0), the 256KB space will be automatically erased before writing the 4KB data; not erased for the remaining blocks;</p> <p>For 0x04 mode:</p> <p>D02:D03=The start ID of the font to be copied, must be no less than 0xC0 (192).</p> <p>D04:D05=The starting ID of the font to be written.</p> <p>D06:D07=The number of fonts to be copied.</p>
0x006D	2	On-chip FLASH read and write	<p>D00: 0x5A starts an on-chip Flash read and write operation, cleared after T5L processing.</p> <p>D01: Operation mode,</p> <p>0x01: Data buffer data is written into the on-chip Flash;</p> <p>0x02: Read the on-chip Flash data to the data buffer.</p> <p>D02:D03: Data buffer address pointer.</p> <p>D04: Number of 4KB data blocks read and written, 0x01-0x10, max 64kbytes per time.</p> <p>D05:D07=On-chip Flash address pointer, 0x00:0000-0x07:F000, 4KB aligned.</p> <p>Users can use a total of 512Kbytes of on-chip Flash space. Read and write according to the 4Kbytes data block; the original data will be restored automatically if the write fails.</p> <p>Example:</p> <p>① Write on-chip flash AA C0 00 6D 5A 01 1000 01 000000 CC 33 C3 3C</p> <p>② Read on-chip flash AA C0 00 6D 5A 02 1000 01 000000 CC 33 C3 3C</p>
0x006F	17	Reservation	Write 0x00.
0x0080	16	System message	D00-D03: CPU main frequency, unit Hz; D04-D63: reserved, read as 0x00.
0x0090	1	System reset control	Writing 0x55AA 5AA5 will reset one-time T5L CPU.
0x0091	1	Code upgrade interface	<p>D00:D01: 0x5AA5 starts an OS core user code upgrade, cleared after T5L operation.</p> <p>D02:D03: pointer to the data buffer address for storing the upgrade code.</p> <p>Fixed upgrade 64KB each time. The original code will be automatically restored if the upgrade is failed.</p>
0x0092	1	PWM1 configuration	<p>D00: 0x5A starts a PWM1 configuration, clears after T5L processing.</p> <p>D01: Frequency division factor.</p> <p>D02:D03: PWM1 output accuracy.</p> <p>PWM1 carrier frequency=CPU main frequency*2/(frequency division factor*PWM1 output precision).</p>
0x0093	1	PWM1 output	<p>D00:D01: PWM1 output high level width, 0x0000-PWM1 output precision.</p> <p>D02:D03: reserved, write 0x0000.</p>
0x0094	5	AD conversion value	<p>D00: 0x5A means that the AD value has been updated.</p> <p>D01-D03: Reserved, write 0x00;</p> <p>D04:D05=ADC0 D06:D07=ADC1 D18: D19=ADC7;</p> <p>AD value = AD pin voltage (mV) *4095/3300 (mV).</p>
0x0099	1895	Reservation	No write
0x0800	256	GUI receives	D00=0x5A, cleared after GUI processing;

		serial data frame	<p>D01: D02=frame data byte length; D03=CMD; D04-D1023=Data, up to 1020 bytes; if CRC is enabled, a CRC value plus 0xAA must be written at the end of the data.</p> <p>Example 1: AA C0 0800 5A 0000 52 CC 33 C3 3C Perform one-time screen cleared.</p> <p>Example 2: AA C0 0800 5A 0011 55 0080 0030 48 6F 77 20 61 72 65 20 79 6F 75 20 3F CC33C33C Display 32*32 GB2312 string "How are you?" in the position (128, 48)</p>
0x0900	1792	Reservation	No write
0x1000	60K	User data storage	240KBytes, accessed with 0xC0, 0xC2 command.

Note: If the data buffer address is continuous, one instruction can be used for write operation. For example, stereo music playback and video playback are examples of two address commands defined. The effect of command a+b described below is equivalent to c. (The data part of a single instruction ≤ 248 bytes)

a: AAC0 0060 5A01 0000 00C0 0000 0000 0100 0000 0000 CC33C33C

b: AAC0 0064 5A01 1800 0000 0004 0000 0000 0000 0000 0320 0258 CC33C33C

c: AAC0 0060 5A01 0000 00C0 0000 0000 0100 0000 0000 5A01 1800 0000 0028 0000 0000 0000 0000 0320 0258 CC33C33C

The user can directly write to the buffer address to realize the pause, fast forward, zoom, volume adjustment and other functions of the video playback function.

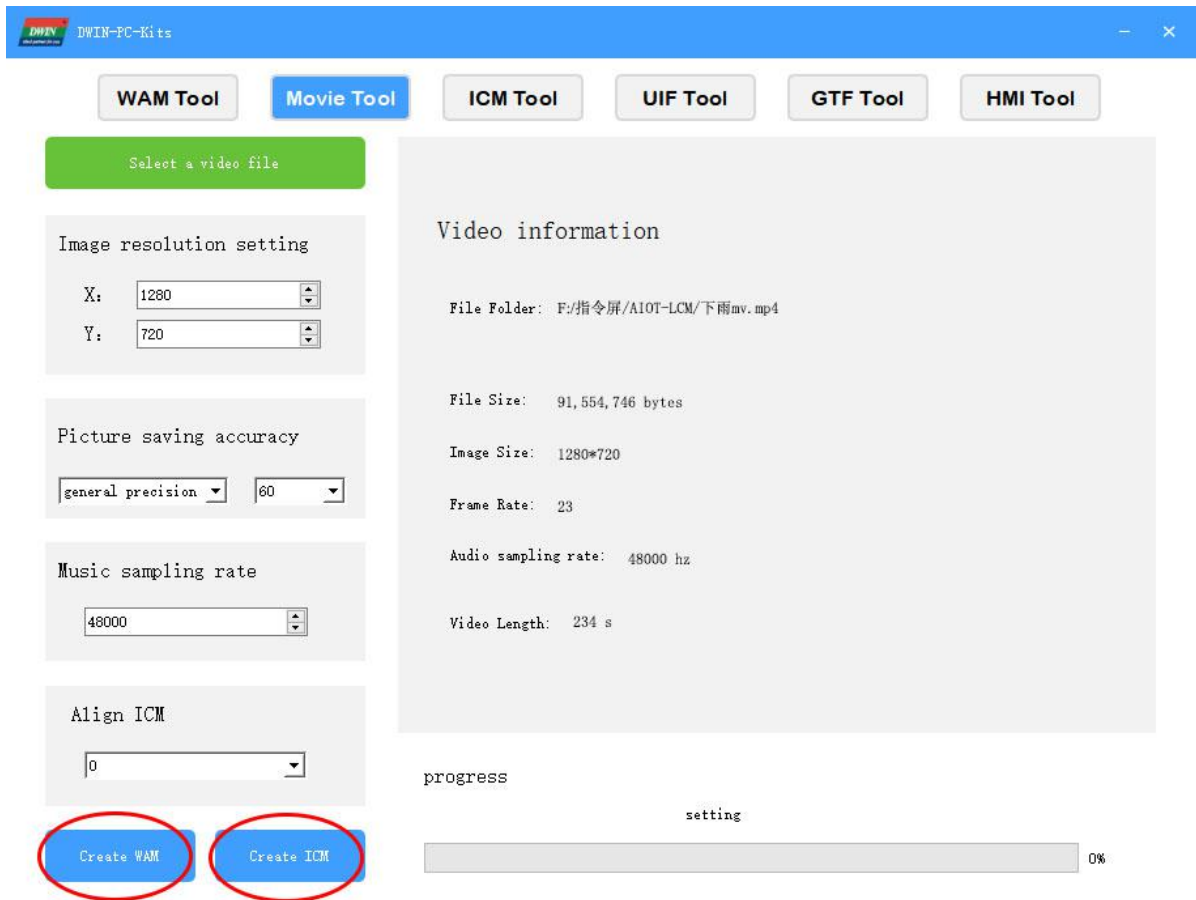
For example, the user needs to adjust the volume of stereo playback, and only needs to write the corresponding value to the address 0x0062.

10 Steps for Converting Video Files into Pictures and Music Files

This chapter mainly introduces how to process video files into ".ICM files" and ".wam."

Use "Movie Tool" to process video files into ".ICM files" and ".wam files."

File naming instructions: Respectively name the converted picture library and music file, such as "40.ICM" and "192.wam" (refer to "4.3 Flash Memory Instructions": Font ID 00-255, each ID occupies 2Mbytes, If a single font file exceeds 2M, it will occupy the ID in turn, name it and reserve it). Put the "40.ICM" and "192.wam" files into the DWIN_SET card, download to the 512MB flash storage on the serial screen.



10.1 Process Into Picture File

1.The number of frames of the picture depends on the attributes of the original video material of the user, such as 30 frames/sec, 24 frames/sec, etc. according to the original video rate.

The user needs to send the corresponding "video playback" command rate according to the actual number of frames.

2.It can arbitrarily set the converted picture resolution.

10.2 Process into Sound File

- 1.The converted .wam format file is 16bit, stereo (dual channel), wam format music file.
- 2.The .wam generation tool can process and compress .wav format files into .wam format collection files.



10.3 UIF Generation Tool Description

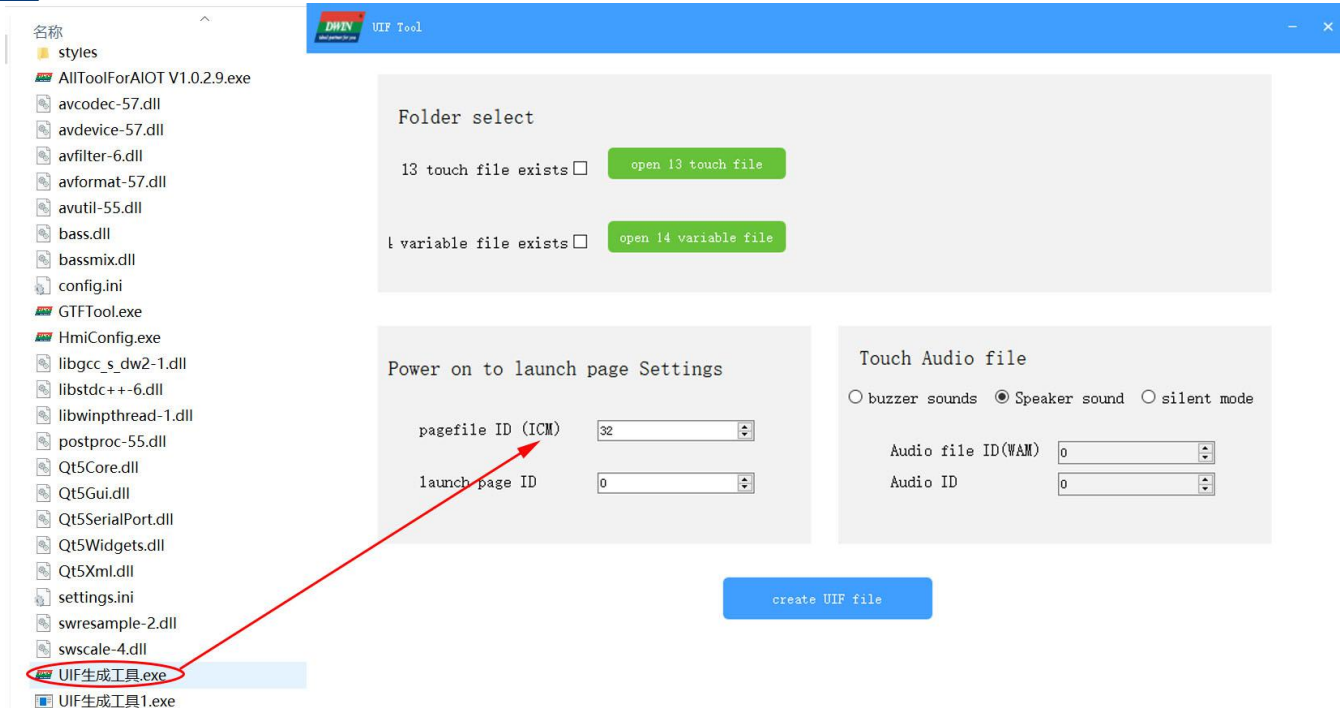
The location ID of the .UIF file is 13, for example 13*.UIF. The function of this file is described below:

- 1.Add 0x78 0x79 command touch configuration file to the .UIF file. (select according to the actual situation)
- 2.Configure the location of the background image library file, configure the page ID for power-on.

For example: the background image library is named 32.icm, the configuration page file ID in the figure below is 32.

- 3.Configure the touch buzzer sound/speaker sound/mute mode.

For example: Configure the sound ID of speaker. The ID is the track number ID in the wam file.

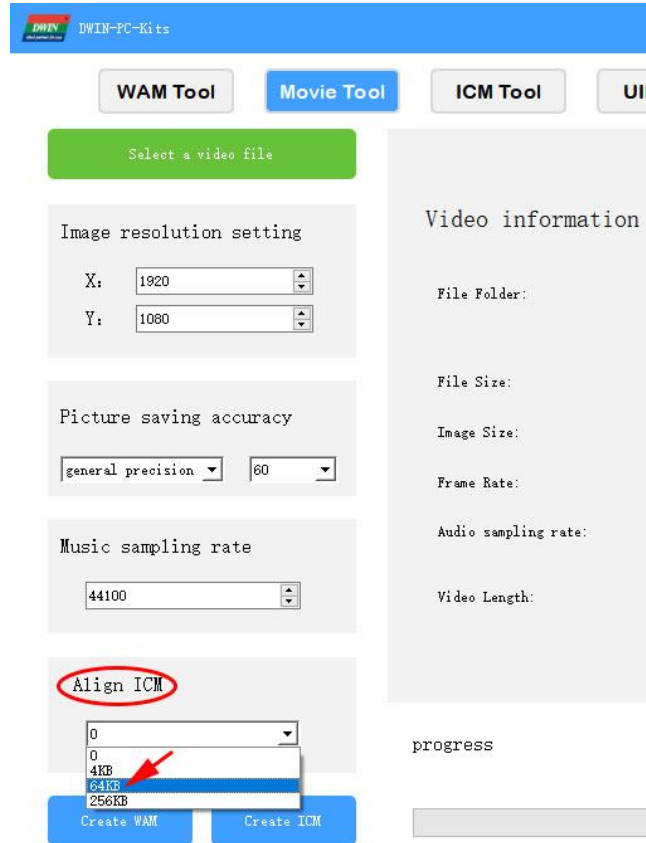


10.4 SD Card Stores Audio (.WAM) or Static Video (.ICM) File Playback

Instructions

1.The alignment format of the ICM file stored in the generated SD card is selected as 64KB alignment, as shown in the figure below for PC software selection:

(Info: The 512M flash storage file icm file on the serial screen PCB board is aligned according to 0KB) .



2. When using a SD card to store audio and video files for playback, you need to format the SD card to 64KB sector (cluster) size to improve the reading speed. SD formatting steps:

If only use the right mouse button to format, the playback may be stuck or cannot be played, please enter the formatting operation under the dos system:

Start = "Run = "Enter command to enter the DOS system, enter

format/q g:/fs:fat32/a:64k

g is the disk number of your SD card win7 system input cmd)

(Info: The card formatted as 64k is no longer applicable for DWIN screen to download DWIN_SET (cluster size is 4096B))

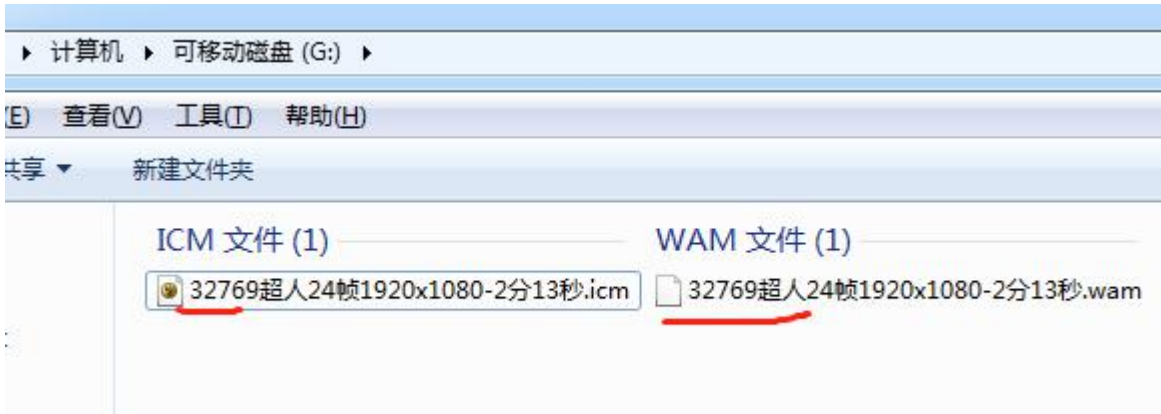
The audio and video files are directly placed in the root directory of the SD card, and the files are named with ID from 32768 to 65535 + file names.

(Remark: The files in the SD card can be named according to the numerical index order. **No need to occupy 2M to name each ID serial number**)

Example of audio file playback instructions stored in SD card:

Play the animation pictures and audio files with a named number index of 32769 in the root directory of the SD card.

AA C0 00 60 5A 01 00 00 8001 00 00 00 00 03 00 00 00 00 00 5A 01 00 00 00 00 8001 00 00 00 00 00 00 00 00 07 80 04 38
CC 33 C3 3C



Appendix A: common problem

NUM.	Q&A
1	<p>Q: What to do if no response to the sending command?</p> <p>A: Please try to check from the following aspects:</p> <ol style="list-style-type: none"> 1. If the serial port connection is correct (cross-wire Rx connects to Tx, Tx connects to Rx); 2. If the baud rate configuration is consistent; 3. Whether to send data in Hex mode or not; 4. If the interface level is consistent (the motherboard and the screen need to be RS232 or TTL level at the same time); 5. If the signal ground is properly connected.
2	<p>Q: After downloading the picture, it is found that the touch is stuck and the page switching is invalid.</p> <p>A: Please check whether the single file size of the generated image file exceeds the specified file size. Background image file storage space (.ICM file).</p> <p>For the T5L1 platform, the size of a single JPG image file should not exceed 252Kbytes. And 764Kbytes for T5L2.</p>
3	<p>Q: Display or touch panel abnormality caused by configuration error.</p> <p>A: Please contact DWIN technical support for the correct factory configuration cfg. Generally, the problem can be solved by downloading, covering and restoring the factory configuration.</p>
4	<p>Q: How is the refresh effect of the video playback function?</p> <p>A: It can smoothly support processing 1920x1080 resolution 60 frame ICM format files.</p>
5	<p>Q: How long does the video playback function support video files?</p> <p>A: PC software can also choose high, medium and low quality compression. According to conventional compression, the size of the converted video depends on the number of frames, resolution, and overall complexity of the picture.</p> <p>Normally, the 512M video stored on the screen can meet the short video of 5-30 minutes for general teaching, publicity and other purposes.</p> <p>If transferring the video playback stored in the SD card, the number and length of video files are almost unlimited due to the large capacity of itself.</p>
6	<p>Q: No need video playback. Can I just use this AIoT LCM platform to play music files?</p> <p>A: Yes. The AIoT LCM platform itself is designed to use separate file storage for music playback and video playback, great convenience for users to perform free and flexible applications.</p>