LCD Module

IMP Series TFT

Application Notes

-Support UART/USB

Ver:1.2
2014-7-15

Subject to change without notice.

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Revised description

Rev	Date	Description
1.0	2012-12-20	First editon
1.1	2012-12-25	Modify library functions
1.2	2014-07-15	Modify 3.5 Series

目　录

1. General Description

IMP series suppots multiple serial interfaces,Supports text,2D drawing ,and pictrue storage and display.Built-in maximum support 2Gbytes memory or external SD card;Built-in file management system,support U disk mode connected to the computer,user can add or remove the pictrue data in this mode;Built-in Simplified chinese,Traditional Chinese,Korean,Japanese,ASCII fonts，You can select font size by Command.Supports JPG,BMP,TGA,PNG format picture decoding display;Support for 2D drawing,。

IMP series TFT intelligent display flexible user access interface and built-in powerful images, text, graphics acceleration engines, will let users can successfully solve the hardware and software development of the doubt, system scheme, a low cost high performance.

2. Feature

●Display type:TFT
●Color depth：16M Colors RGB format:RGB(888)
●Built in simplified Chinese (GB2312), traditional Chinese (BIG5), Korean (HANGUL), Japanese (S-JIS), ASCII font font size half / full width: 8*16/16*16, 12*24/24*24, 16*32/32*32, through the instruction selection
●2D graphics (point, line, circle, ellipse, curve, rectangle) drawing function
●Built in file management system, support U disk model and computer communication.
●Support JPG, BMP, TGA, PNG format image files directly decode and display, and to support the zoom pictures. Large capacity image buffer, may realize the animation display.
●Built in memory, the capacity to support 128MByte~2GByte, can be accessed directly through the U disk mode or user interface
●Support the ID identification, can realize cascade control
●Support interface：USB/UART(TTL:3.3V)/RS232/RS485/RS422
●operating voltage:5.0V or 3.3V

3. Product ordering information

XXX X XX X XX — X

Operating range
C:Commercial
I:Industrial

Interface type:
01:UART(TTL:3.3V)
02:RS232
03:RS485
04:RS422
05:USB

Operating voltage:
C:5.0V
L:3.3V

Memory:
28:Built-in 128M Bytes FLASH
56:28:Built-in 256M Bytes FLASH
12:Built-in 512M Bytes FLASH
01:Built-in 1G Bytes FLASH
02:Built-in 2G Bytes FLASH
SD:Support external SD card, maximum support 2G Bytes

Touch panel:
T:whith touch panel
N:without

LCD Size(inch):
Such as: A035 means that the LCD size is 3.5 inch, 070 means that the LCD size is 7 inc

4. Selection proposal

UART(TTL): Support direct communication with the MCU UART, UART must be noted that the product is 3.3VTTL level, if 5V MCU to communicate directly with the level needed to make the conversion process, the signal transmission distance should not exceed 20cm

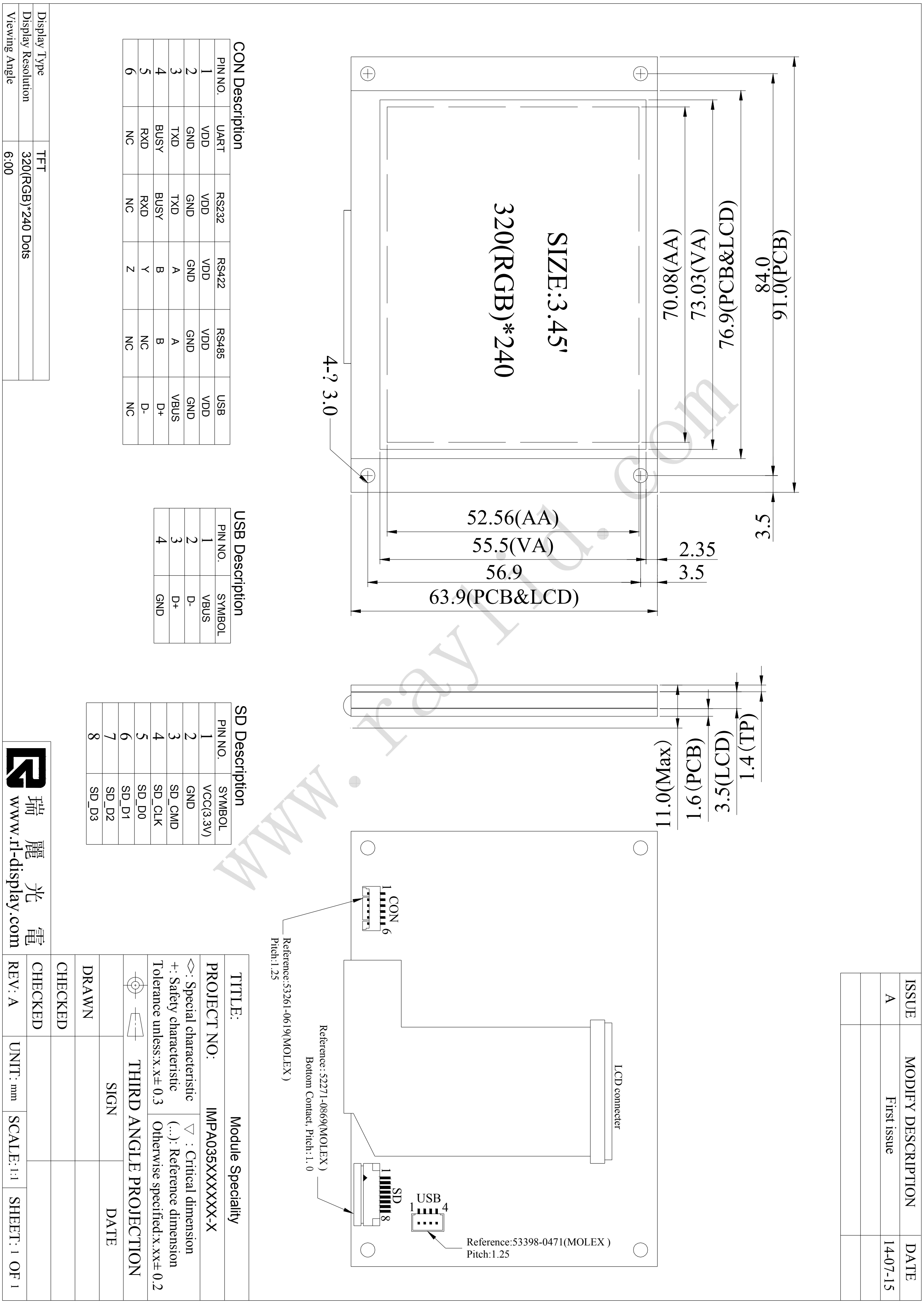
RS232: Standard RS232 signal transmission distance up to 10m.

RS485/RS422: Standard RS485/RS422 signal transmission distance up to 1000m.

USB: USB2.0, Users select products such interfaces can communicate directly with the PC or computer motherboard.

5. Structural drawings

5.1 IMPA035 Series



5.2 IMP040 Series

Display Type	TFT
Display Resolution	320(RGB)*240 Dots
Viewing Angle	6:00

CON Description

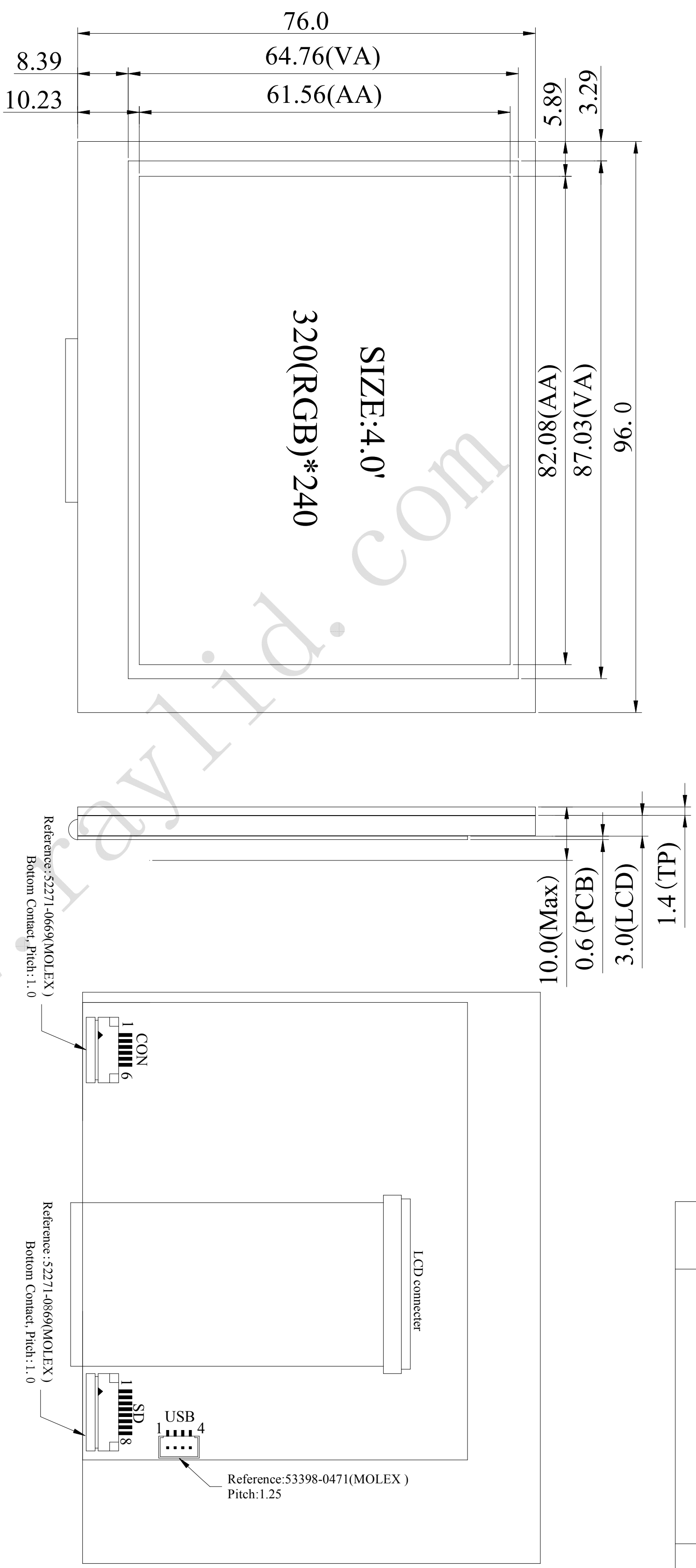
PIN NO.	UART	RS232	RS422	RS485	USB
1	VDD	VDD	VDD	VDD	VDD
2	GND	GND	GND	GND	GND
3	TXD	TXD	A	A	VBUS
4	BUSY	BUSY	B	B	D+
5	RXD	RXD	Z	NC	D-
6	NC	NC	Y	NC	NC

USB Description

PIN NO.	SYMBOL
1	VBUS
2	D-
3	D+
4	GND

SD Description

PIN NO.	SYMBOL
1	VCC(3.3V)
2	GND
3	SD_CMD
4	SD_CLK
5	SD_D0
6	SD_D1
7	SD_D2
8	SD_D3



ISSUE	MODIFY DESCRIPTION	DATE
A	First issue	12-09-05

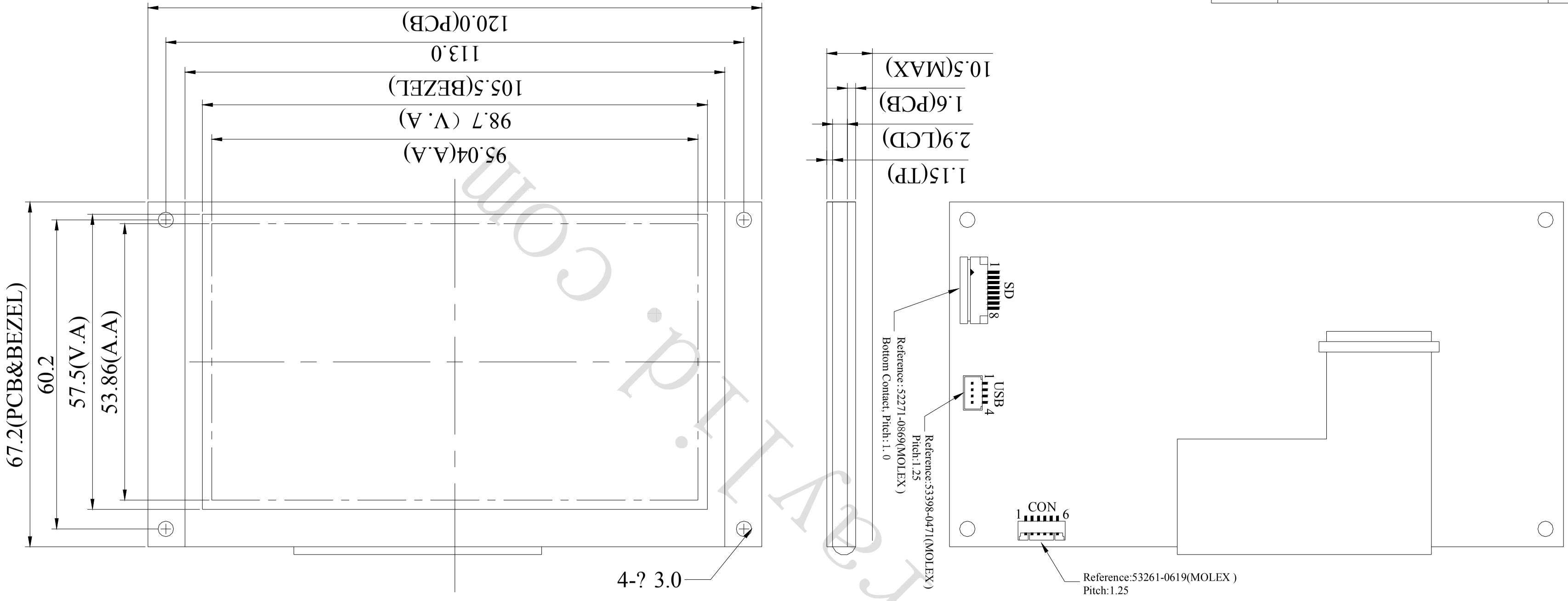
TITLE: Module Speciality
PROJECT NO: IMP040XXXXX-X
◇: Special characteristic ▽: Critical dimension
+: Safety characteristic (...): Reference dimension
Tolerance unless: x.x± 0.3 Otherwise specified: x.xx± 0.2
THIRD ANGLE PROJECTION

	SIGN	DATE
DRAWN		
CHECKED		
CHECKED		

REV: A | UNIT: mm | SCALE: 1:1 | SHEET: 1 OF 1

5.3 IMP043 Series

ISSUE	MODIFY DESCRIPTION	DATE
A	First issue	12-08-12



CON Description

PIN NO.	UART	RS232	RS422	RS485	USB
1	VDD	VDD	VDD	VDD	VDD
2	GND	GND	GND	GND	GND
3	TXD	TXD	A	A	VBUS
4	BUSY	BUSY	B	B	D+
5	RXD	RXD	Z	NC	D-
6	NC	NC	Y	NC	NC

USB Description

PIN NO.	SYMBOL
1	VBUS
2	D-
3	D+
4	GND

SD Description

PIN NO.	SYMBOL
1	VCC(3.3V)
2	GND
3	SD_CMD
4	SD_CLK
5	SD_D0
6	SD_D1
7	SD_D2
8	SD_D3

Display Type	TFT
Display Resolution	480(RGB)*272Dots
Viewing Angle	6:00

TITLE: Module Speciality

PROJECT NO: IMP043XXXXXX-X

<>: Special characteristic
+: Safety characteristic
Tolerance unless:x.x± 0.3

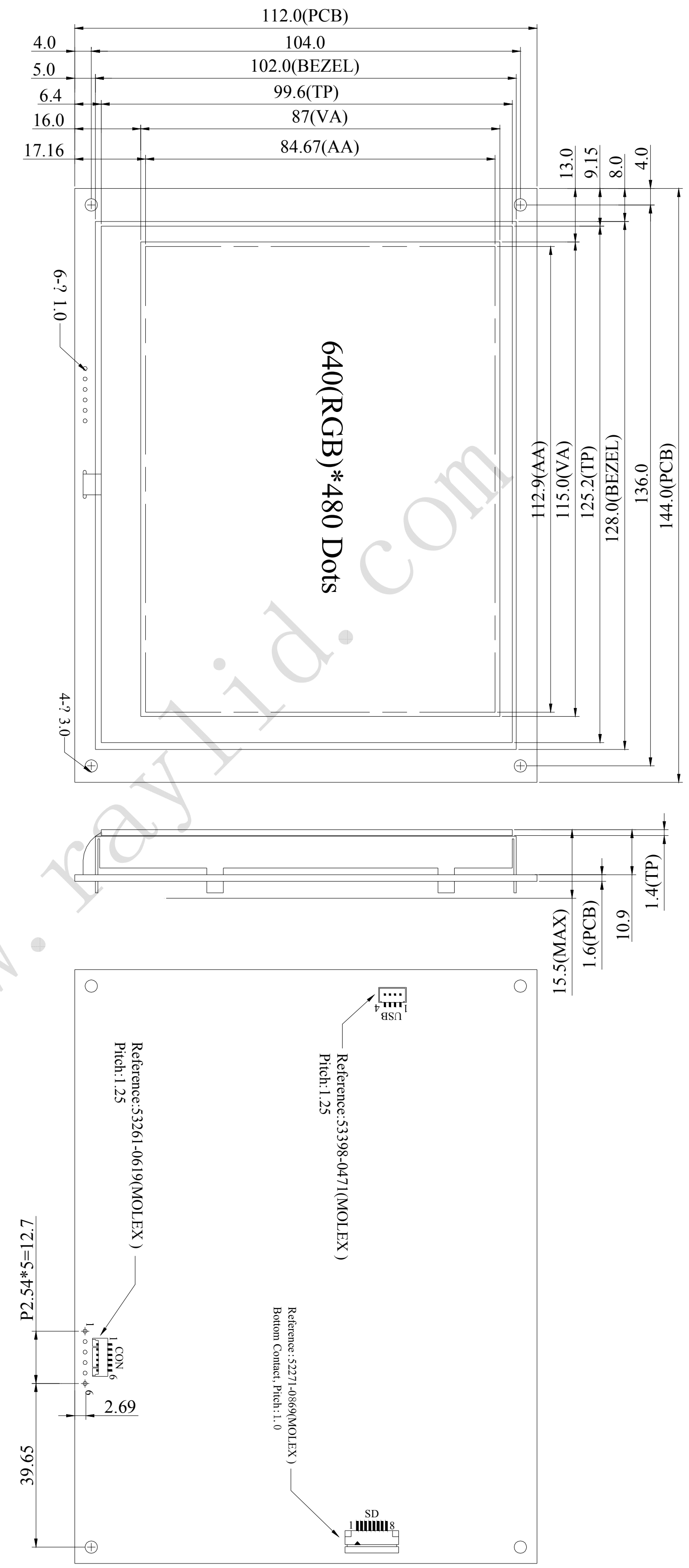
▽ : Critical dimension
(...): Reference dimension
Otherwise specified:x.xx± 0.2

THIRD ANGLE PROJECTION

	SIGN	DATE
DRAWN		
CHECKED		
CHECKED		

REV: A | UNIT: mm | SCALE: 1:1 | SHEET: 1 OF 1

5.4 IMP056 Series



Display Type	TFT
Display Resolution	640(RGB)*480 Dots
Viewing Angle	6:00

CON Description

PIN NO.	UART	RS232	RS422	RS485	USB
1	VDD	VDD	VDD	VDD	VDD
2	GND	GND	GND	GND	GND
3	TXD	TXD	A	A	VBUS
4	BUSY	BUSY	B	B	D+
5	RXD	RXD	Z	NC	D-
6	NC	NC	Y	NC	NC

USB Description

PIN NO.	SYMBOL
1	VBUS
2	D-
3	D+
4	GND

SD Description

PIN NO.	SYMBOL
1	VCC(3.3V)
2	GND
3	SD_CMD
4	SD_CLK
5	SD_D0
6	SD_D1
7	SD_D2
8	SD_D3

ISSUE	MODIFY DESCRIPTION	DATE
A	First issue	12-12-22

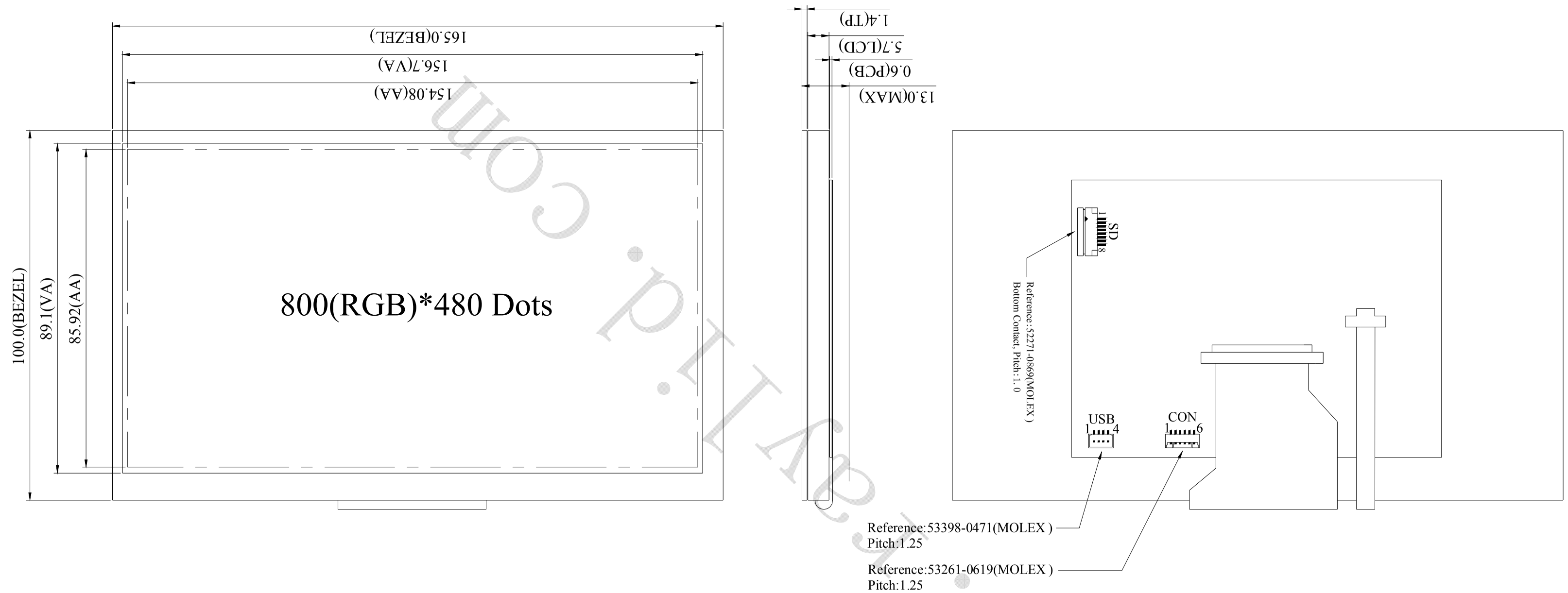
TITLE: Module Specialty
PROJECT NO: IMP056XXXXXX-X
◇: Special characteristic ▽ : Critical dimension
+: Safety characteristic (...): Reference dimension
Tolerance unless:x.x± 0.3 Otherwise specified:x.xx± 0.2
THIRD ANGLE PROJECTION

	SIGN	DATE
DRAWN		
CHECKED		
CHECKED		

REV: A | UNIT: mm | SCALE: 1:1 | SHEET: 1 OF 1

5.5 IMP070 Series

ISSUE	MODIFY DESCRIPTION	DATE
A	First issue	12-11-28



CON Description

PIN NO.	UART	RS232	RS422	RS485	USB
1	VDD	VDD	VDD	VDD	VDD
2	GND	GND	GND	GND	GND
3	TXD	TXD	A	A	VBUS
4	BUSY	BUSY	B	B	D+
5	RXD	RXD	Z	NC	D-
6	NC	NC	Y	NC	NC

USB Description

PIN NO.	SYMBOL
1	VBUS
2	D-
3	D+
4	GND

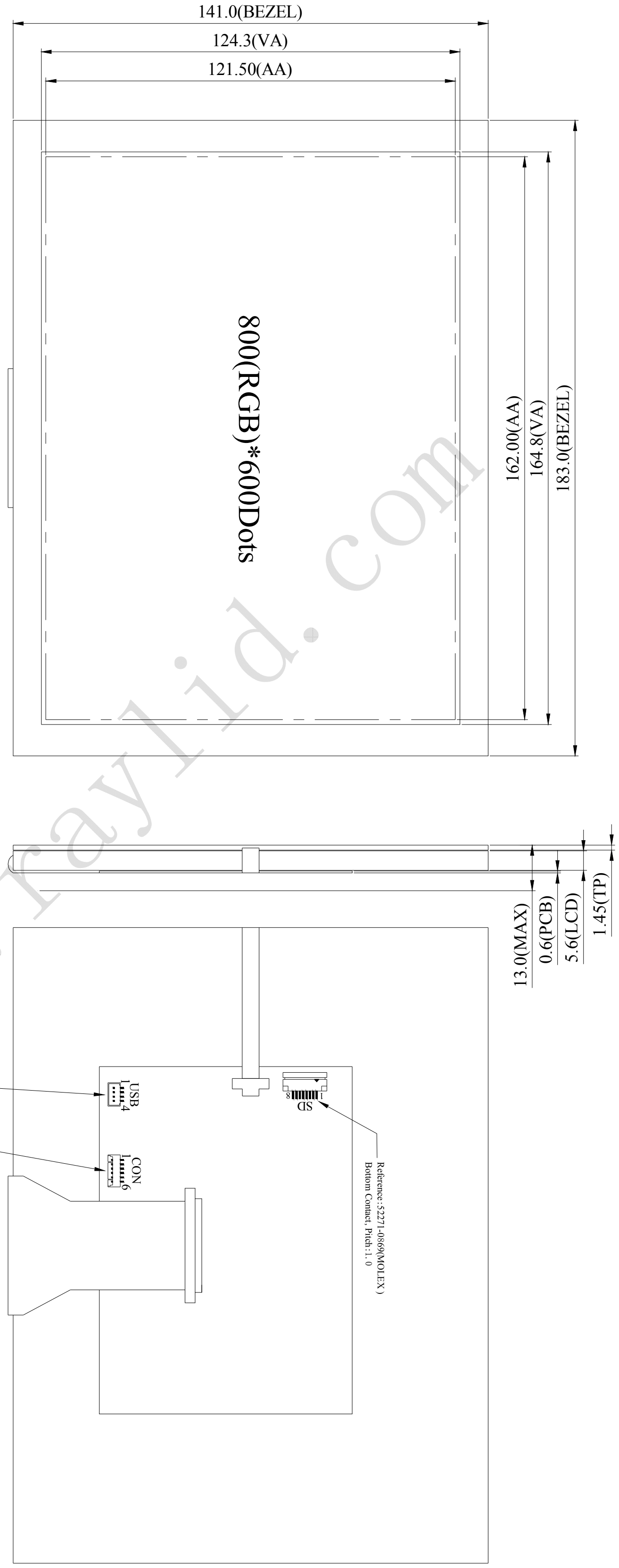
SD Description

PIN NO.	SYMBOL
1	VCC(3.3V)
2	GND
3	SD_CMD
4	SD_CLK
5	SD_D0
6	SD_D1
7	SD_D2
8	SD_D3

Display Type	TFT
Display Resolution	800(RGB)*480 Dots
Viewing Angle	6:00

TITLE:	Module Speciality		
PROJECT NO:	IMP070XXXXXX-X		
<>: Special characteristic +: Safety characteristic Tolerance unless:x.x± 0.3	▽ : Critical dimension (...): Reference dimension Otherwise specified:x.xx± 0.2		
THIRD ANGLE PROJECTION			
	SIGN	DATE	
DRAWN			
CHECKED			
CHECKED			
REV: A	UNIT: mm	SCALE: 1:1	SHEET: 1 OF 1

5.6 IMP080 Series



ISSUE	MODIFY DESCRIPTION	DATE
A	First issue	12-12-18

CON Description

PIN NO.	UART	RS232	RS422	RS485	USB
1	VDD	VDD	VDD	VDD	VDD
2	GND	GND	GND	GND	GND
3	TXD	TXD	A	A	VBUS
4	BUSY	BUSY	B	B	D+
5	RXD	RXD	Z	NC	D-
6	NC	NC	Y	NC	NC

USB Description

PIN NO.	SYMBOL
1	VBUS
2	D-
3	D+
4	GND

SD Description

PIN NO.	SYMBOL
1	VCC(3.3V)
2	GND
3	SD_CMD
4	SD_CLK
5	SD_D0
6	SD_D1
7	SD_D2
8	SD_D3

Display Type	TFT
Display Resolution	800(RGB)*600 Dots
Viewing Angle	6:00

TITLE:	Module Speciality	
PROJECT NO:	IMP080XXXXXX-X	
<>: Special characteristic +: Safety characteristic Tolerance unless:x.x± 0.3	▽ : Critical dimension (...): Reference dimension Otherwise specified:x.xx± 0.2	
THIRD ANGLE PROJECTION		
	SIGN	DATE
DRAWN		
CHECKED		
CHECKED		
REV: A	UNIT: mm	SCALE: 1:1
SHEET: 1 OF 1		

6. Interface Definiton

6.1 Contrl and Power Interface

Port type	Pin No.	Symbol	Functions
UART(TTL)	1	VDD	Power supply
	2	GND	Ground
	3	TXD	UART TXD output
	4	BUSY	UART busy output,high is busy
	5	RXD	UART RXD input
	6	NC	No connection
RS232	1	VDD	Power supply
	2	GND	Ground
	3	TXD	RS232 TXD output
	4	BUSY	RS232 busy output,high is busy
	5	RXD	RS232 RXD input
	6	NC	No connection
RS422	1	VDD	Power supply
	2	GND	Ground
	3	A	Noninverting Receiver Input
	4	B	Inverting Receiver Input
	5	Z	Inverting Driver Output
	6	Y	Noninverting Driver Output
RS485	1	VDD	Power supply
	2	GND	Ground
	3	A	Noninverting Receiver Input
	4	B	Inverting Receiver Input
	5	NC	No connection
	6	NC	No connection
USB	1	VDD	Power supply
	2	GND	Ground
	3	VBUS	USB VBUS
	4	D+	USB D+
	5	D-	USB D-
	6	GND	USB Ground

NOTE: The above interface definition corresponds to the product "CON" connector, power supply and control signal input via the interface.

6.2 USB Interface

Pin No.	symbol	Functions
1	VBUS	USB VBUS
2	D-	USB D-
3	D+	USB D+
4	GND	USB Ground

NOTE: The above interface defines the corresponding product "USB" connector supporting USB2.0. Users can interface with the computer via USB direct communication, then the user in the U disk mode to edit, add, delete files in memory (eg: Image File)

6.2 SD Interface

Pin No.	Symbol	Functions
1	VCC(3.3V)	3.3V power output
2	GND	Ground
3	SD_CMD	Bidirectional Command/Response signal
4	SD_CLK	Host to card clock signal
5	SD_D0	Bidirectional data signals
6	SD_D1	
7	SD_D2	
8	SD_D3	

NOTE：The above interface defines the corresponding product "SD" connector. Limited to support SD cards, refer to the **Product ordering information.**

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7 DC Electrical Characteristics

7.1 IMPA035 Series

Power Supply	Item	Min	Typ	Max	Unit
3.3	VDD	3.2	3.3	3.6	V
	IDD	155	-	295	mA
5.0	VDD	4.7	5	5.5	V
	IDD	150	-	245	mA

7.2 IMP040 Series

Power Supply	Item	Min	Typ	Max	Unit
3.3	VDD	3.2	3.3	3.6	V
	IDD	155	-	240	mA
5.0	VDD	4.7	5.0	5.5	V
	IDD	150	-	210	mA

7.3 IMP043 Series

Power Supply	Item	Min	Typ	Max	Unit
5.0	VDD	4.7	5.0	5.5	V
	IDD	150	-	340	mA

7.4 IMP056 Series

Power Supply	Item	Min	Typ	Max	Unit
5.0	VDD	4.7	5.0	5.5	V
	IDD	150	-	490	mA

7.5 IMP070 Series

Power Supply	Item	Min	Typ	Max	Unit
5.0	VDD	4.7	5.0	5.5	V
	IDD	150	-	560	mA

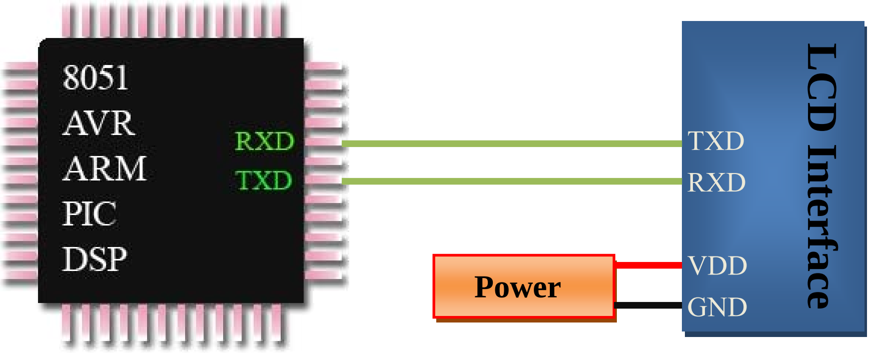
7.6 IMP084 Series

Power Supply	Item	Min	Typ	Max	Unit
5.0	VDD	4.7	5.0	5.5	V
	IDD	150	-	620	mA

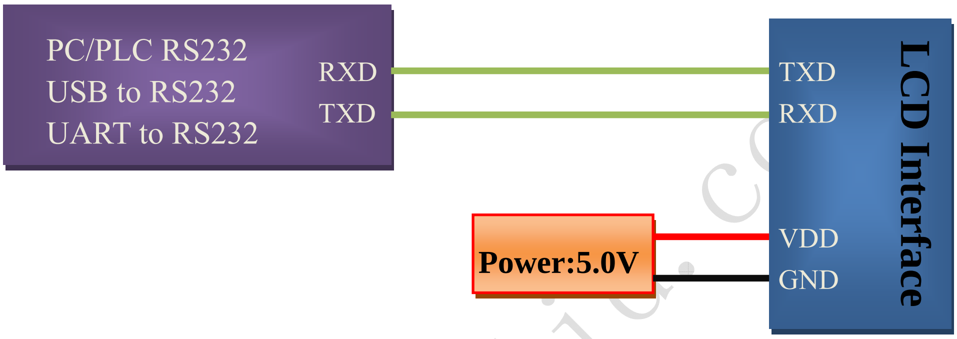
8. Applications

8.1 Interface Features

- UART(TTL:3.3V):Can be directly connected with the MCU UART interface.



- RS232,can be directly connected with PC,PLC.



- RS422/485:Transmission distance up to 1km.

8.2 Communication Protocol

Band rate：9600b/s（Default）

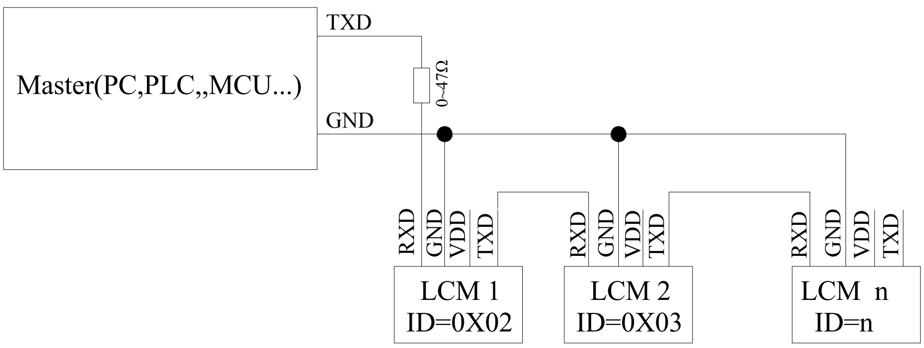
Data bits：8bit

Parity bit：None

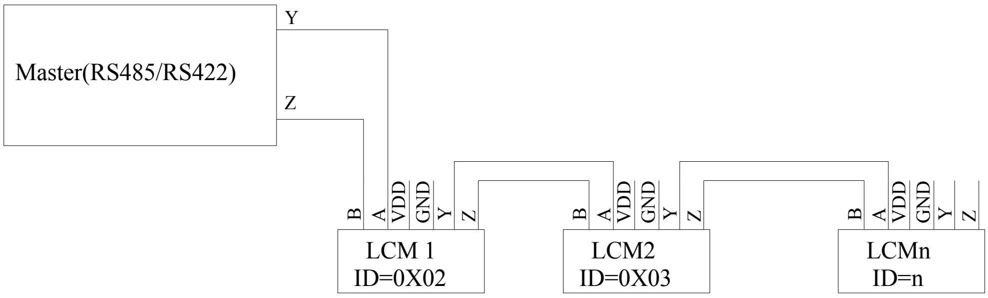
Stop bit：1bit

8.3 Cascade control (Only does not support the touch panel products)

Does not support the TouchPad Products Support ID recognition, Cascade control can be achieved when using, All the equipment at the same time the receiving host ommand, Determine the control object through the ID segment in the order. Communication connection refer to the diagram.



UART(TTL) or RS232 interface



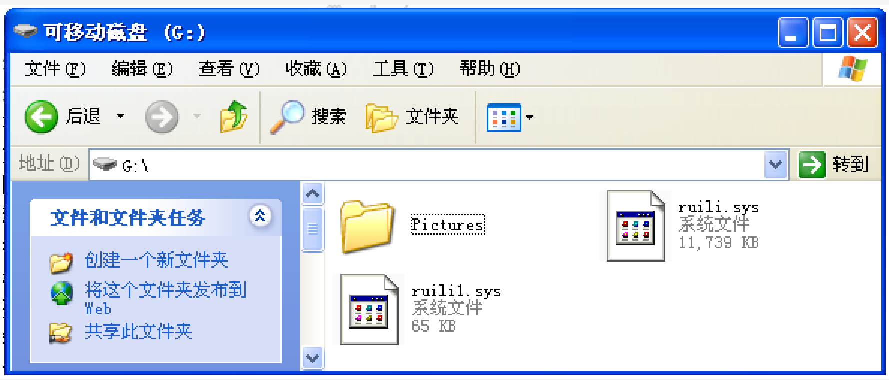
RS422 interface

8.4 Picture Storage And Display

8.4.1 Picture Storage

Users can in the U disk mode, copy the edited picture to the screen " Pictures " folder. When in use, The user can specify the file name is called by the command display

Product USB interface connected to the computer, in the "My Computer" to increase the "Removable Disk G"



The edited pictures are copied to the "Pictures" folder

Stored in the "pictures" directory of pictures, can be directly invoked by the command

8.4.2 Picture Display

IMP Series Intelligent LCD picture display provides a wealth of commands, users can flexibly in accordance with the design requirements. Specific reference library function " display" section.

Example: Display Pictures folder "3.jpg" file on the LCD.

- Calling code

```
void mian()
{
	picture_xy(ID,"3.jpg",0,0);	// The picture "3.jpg" display at 0,0
	while(1);
}
```

- Execution results:

LCD Display

9. Software Library(c)

9.1 Software Library table

Type	Function	Description
System	display_ID()	Display product information
	void reset()	Reset
	void clear_display(U8 ID)	Clear display
	void display_on(U8 ID)	Display on
	void display_off(U8 ID)	Display off
	void baud(U8 ID,U16 n)	Change the baud rate(Default 9600b/s)
	void modify_ID(U8 oid,U8 nid)	Change the ID
Text	void foreground_color(U8 ID,U8 r,U8 g,U8 b)	Text foreground color
	void background_color(U8 ID,U8 r,U8 g,U8 b)	Text background color
	void background_transparen(U8 ID)	Text background transparen
	void backgrond_nor_transparen(U8 ID)	Text background nor-transparen
	void cusor_xy(U8 ID,U16 x,U16 y)	Cursor position
	void simplified_chinese(U8 ID)	Select simplified chinese character
	void traditional_chinese(U8 ID)	Select traditional chinese character
	void japanese(U8 ID)	Select Japanese character
	void korean(U8 ID)	Select Korean character
	void font_size_16(U8 ID)	Select font size 8*16/16*16(Default)
	void font_size_24(U8 ID)	Select font size 12*24/24*24
	void font_size_32(U8 ID)	Select font size 16*32/32*32
	void line_spacing(U8 ID,U8 n)	Set text line spacing(Default:0)
	void row_spacing(U8 ID,U8 n)	Set text row spacing(Default:0)
	void print_string(U8 ID,U8 *ptr)	Display string in the current cursor position
	void print_string_xy(U8 ID,U16 x,U16 y,U8 *ptr)	Display the string at the specified coordinates
	void print_U32(U8 ID,U32 n)	Display long integer variable int the current cursor position
	void print_U32_xy(U8 ID,U16 x,U16 y,U32 n)	A long integer variable display at the specified coordinates
2D Draw	void draw_pixel(U8 ID,U16 x,U16 y,U8 r,U8 g,U8 b)	Draw a pixel
	void draw_line(U8 ID,U16 x1,U16 y1,U16 x2,U16 y2,U8 r,U8 g,U8 b)	Draw a line
	void draw_rectangle(U8 ID,U16 x,U16 y,U16 w,U16 h,U8 r,U8 g,U8 b)	Draw a square
	void draw_rectangle_fill(U8 ID,U16 x,U16 y,U16 w,U16 h,U8 r,U8 g,U8 b)	Draw a square fill
	void draw_circle_square(U8 ID,U16 x,U16 y,U16 w,U16 h,U16 ra,U8 r,U8 g,U8 b)	Draw a Circle Square
	void draw_circle_square_fill(U8 ID,U16 x,U16 y,U16 w,U16 h,U16 ra,U8 r,U8 g,U8 b)	Draw a Circle Square Fill
	void draw_circle(U8 ID,U16 x,U16 y,U16 ra,U8 r,U8 g,U8 b)	Draw a Circle

	void draw_circle_fill(U8 ID,U16 x,U16 y,U16 ra,U8 r,U8 g,U8 b)	Draw a Circle Fill
	void draw_ellipse(U8 ID,U16 x,U16 y,U16 xra,U16 yra,U8 r,U8 g,U8 b)	Draw a ellipse
	void draw_ellipse_fill(U8 ID,U16 x,U16 y,U16 xra,U16 yra,U8 r,U8 g,U8 b)	Draw a ellipse fill
Pictures	void picture_xy(U8 ID,U8 *filename,U16 x,U16 y)	Display pictures in the specified location
	void pitrure_spread(U8 ID,U8 *filename,U16 x,U16 y,U8 s)	Spread around display pictures
	void picture_right_to_left(U8 ID,U8 *filename,U16 x,U16 y,U8 s)	Insert displayed from right to left
	void picture_left_to_right(U8 ID,U8 *filename,U16 x,U16 y,U8 s)	Insert displayed from left to right
	void picture_up_to_down(U8 ID,U8 *filename,U16 x,U16 y,U8 s)	Insert displayed from up to down
	void picture_down_to_up(U8 ID,U8 *filename,U16 x,U16 y,U8 s)	Insert displayed from down to up
	void picture_horizontally(U8 ID,U8 *filename,U16 x,U16 y,U8 s)	Laterally expanded display
	void picture_vertical(U8 ID,U8 *filename,U16 x,U16 y,U8 s)	Longitudinally mounted display
	void picture_clip(U8 ID,U8 *filename,U16 x,U16 y,U16 lx,U16 ly,U16 w,U16 h)	Pictures Clip
	void picture_zom(U8 ID,U8 *filename,U16 x,U16 y,U16 w,U16 h)	Pictures Zoom
	void picture_best_show(U8 ID,U8 *filename,U16 x,U16 y,U16 w,U16 h)	Beset display in designated areas
Windows UI	void windows(U8 ID, U16 x,U16 y,U16 w,U16 h,U8 *name)	Forms UI
	void windows_click(U8 ID, U16 x,U16 y,U16 w,U16 h)	Click closed forms UI
	void button(U8 ID, U16 x,U16 y,U16 w,U16 h)	button UI
	void button_click(U8 ID, U16 x,U16 y,U16 w,U16 h)	Press the button UI
	void textbox(U8 ID, U16 x,U16 y,U16 w,U16 h)	Textbox UI
	void frame(U8 ID, U16 x,U16 y,U16 w,U16 h,U8 *name)	Frame UI
Touch Panel	void touch_reset()	Touch panel calibration
	void touch_press_down()	When pressed,send touch coordinates
	void touch_loosen()	When loosening,Send touch coordinates
	0XAA 0X55 xh xl yh hl	Output command,output touch coordinates

Note: *Support for touch products, do not support the ID recognition, Support touch screen products, ID is "0".*

9.2 Function Application

9.2.1 Display_ID()

Display product information

9.2.2 void reset()

Product Reset

9.2.3 void clear_display(U8 ID)

Clear display,

Parameter:

ID：Current ID

9.2.4 void display_on(U8 ID)

Turn on the display.

Parameter:

ID：Current ID

9.2.5 void display_off(U8 ID)

Display off

Parameter:

ID：Current ID

9.2.6 void baud(U8 ID,U16 n)

Change the baud rate(Default 9600b/s)

Parameter:

ID：Current ID

n：9600、19200、38400、57600、115200。

9.2.7 void modify_ID(U8 oid,U8 nid)

Change the ID,Products factory default ID is 0XFF.The user can send “0XAA 0X00”to products,display the current ID.

Parameter:

oid：Current ID

nid：The new ID,range is 0x02~0xff。

note：This command can also be set manually by PC, set the instruction manual: 0XAA oid 0X15 nid, ID has the electricity saving function, product factory default value is 0XFF. Support for touch screen control products, does not support the ID identification function.

9.2.8 void foreground_color(U8 ID,U8 r,U8 g,U8 b)

Set text foreground color,Default:0XFFFFFF(white)

Parameter:

ID：Current ID

r:red(0~0xff)

g:green(0~0xff)

b:blue(0~0xff)

9.2.9 void background_color(U8 ID,U8 r,U8 g,U8 b)

Set text background color

Parameter:

ID：Current ID

r:red(0~0xff)

g:green(0~0xff)

b:blue(0~0xff)

9.2.10 void background_transparen(U8 ID)

Set text background transparen。

Parameter:

ID：Current ID

9.2.11 void background_nor_transparen(U8 ID)

Set text background non-transparen。

Parameter:

ID：Current ID

Transparen mode　　　　　　non-transparen mode

9.2.12 void cusor_xy(U8 ID,U16 x,U16 y)

Set the text displayed the starting coordinates

Parameter:

ID：Current ID

x:0~ Horizontal resolution-1

y:0~ Vertical resolution-1

9.2.13 void simplified_chinese(U8 ID)(*Default)*

Select the current font for simplified chinese.

Parameter:

ID：Current ID

9.2.14 void traditional_chinese(U8 ID)

Select the current font for traditional chinese.

Parameter:

ID：Current ID

9.2.15 void japanese(U8 ID)

Select the current font for japanese

Parameter:

ID：Current ID

9.2.16 void korean(U8 ID)

Select the current font for korean

Parameter:

ID：Current ID

9.2.17 void font_size_16(U8 ID)(*Default)*

*Select the font size is 8*16/16*16*

Parameter:

ID：Current ID

9.2.18 void font_size_24(U8 ID)

*Select the font size is 12*24/24*24*

Parameter:

ID：Current ID

9.2.19 void font_size_32(U8 ID)

*Select the font size is 12*24/24*24*

Parameter:

ID：Current ID

9.2.20 void line_spacing(U8 ID,U8 n)

Set line spacing。

Parameter:

ID：Current ID

n(0~0XFF), Default:0

9.2.21 void row_spacing(U8 ID,U8 n)

Set line spacing。

Parameter:

ID：Current ID

n(0~0XFF), Default:0

9.2.22 void print_string(U8 ID,U8 *ptr)

In the current coordinate display string.

Parameter:

ID：Current ID

9.2.23 void print_string_xy(U8 ID,U16 x,U16 y,U8 *ptr)

At the specified coordinates display string

Parameter:

ID：Current ID

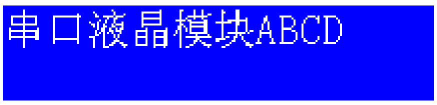
x:0~ Horizontal resolution-1

y:0~ Vertical resolution-1

**ptr:The string to display*

Usage:

```
void main()
{
    print_string_xy(ID,0,0,"串口液晶模块ABCD"); // The coordinates 0,0, display "串口
    while(1);                                    //液晶模块ABCD "
}
```



LCD Display

9.2.24 void print_U32(U8 ID,U32 n)

Display long integer variables in the current cursor position

Parameter:

ID：Current ID

n:0~0XFFFFFFFF

9.2.25 void print_U32_xy(U8 ID,U16 x,U16 y,U32 n)

A long integer variable display in the specified coordinates

Parameter:

ID：Current ID

x:0~ Horizontal resolution-1

y:0~ Vertical resolution-1

n:0~0XFFFFFFFF

Usage:

```
void main()
{
        print_U32_xy(ID,0,0,"123456"); // The coordinates 0,0, display "123456"
        while(1);
}
```

LCD Display

9.2.26 void draw_pixel(U8 ID,U16 x,U16 y,U8 r,U8 g,U8 b)

Draw a pixel at the specified location

Parameter:

ID：Current ID

x:0~ Horizontal resolution-1

y:0~ Vertical resolution-1

r:red(0~0xff)

g:green(0~0xff)

b:blue(0~0xff)

9.2.27 void draw_line(U8 ID,U16 x1,U16 y1,U16 x2,U16 y2,U8 r,U8 g,U8 b)

Draw a line

Parameter:

ID：Current ID

x1:0~ Horizontal resolution-1

y1:0~ Vertical resolution-1

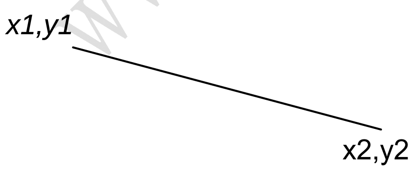
x2:0~ Horizontal resolution-1

y2:0~ Vertical resolution-1

r:red(0~0xff)

g:green(0~0xff)

b:blue(0~0xff)



9.2.28 void draw_rectangle(U8 ID,U16 x,U16 y,U16 w,U16 h,U8 r,U8 g,U8 b)

Draw a rectangle.

Parameter:

ID：Current ID

x:0~ Horizontal resolution-1

y:0~ Vertical resolution-1

w:x+h≤Horizontal resolution

h:y+h≤Vertical resolution

r:red(0~0xff)

g:green(0~0xff)

b:blue(0~0xff)

9.2.29 void draw_rectangle_fill(U8 ID,U16 x,U16 y,U16 w,U16 h,U8 r,U8 g,U8 b)

Draw a rectangle fill.

Parameter:

ID：Current ID

x:0~ Horizontal resolution-1

y:0~ Vertical resolution-1

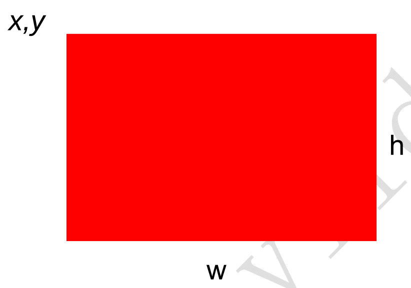
w:x+h⩽Horizontal resolution

h:y+h⩽Vertical resolution

r:red(0~0xff)

g:green(0~0xff)

b:blue(0~0xff)



9.2.30 void draw_circle_square(U8 ID,U16 x,U16 y,U16 w,U16 h,U16 ra,U8 r,U8 g,U8 b)

Draw a circle rectangle.

Parameter:

ID：Current ID

x:0~ Horizontal resolution-1

y:0~ Vertical resolution-1

w:x+h⩽Horizontal resolution

h:y+h⩽Vertical resolution

ra:fillet radius

r:red(0~0xff)

g:green(0~0xff)

b:blue(0~0xff)

9.2.31 void draw_circle_square_fill(U8 ID,U16 x,U16 y,U16 w,U16 h,U16 ra,U8 r,U8 g,U8 b)

Draw a circle rectangle fill.

Parameter:

ID：Current ID

x:0~ Horizontal resolution-1

y:0~ Vertical resolution-1

w:x+h⩽Horizontal resolution

h:y+h≤Vertical resolution

ra:fillet radius

r:red(0~0xff)

g:green(0~0xff)

b:blue(0~0xff)

9.2.32 void draw_circle(U8 ID,U16 x,U16 y,U16 ra,U8 r,U8 g,U8 b)

Draw a circle.

Parameter:

ID：Current ID

x:0~ Horizontal resolution-1

y:0~ Vertical resolution-1

ra:radius

r:red(0~0xff)

g:green(0~0xff)

b:blue(0~0xff)

9.2.33 void draw_circle_fill(U8 ID,U16 x,U16 y,U16 ra,U8 r,U8 g,U8 b)

Draw a circle fill.

Parameter:

ID：Current ID

x:0~ Horizontal resolution-1

y:0~ Vertical resolution-1

ra:radius

r:red(0~0xff)

g:green(0~0xff)

b:blue(0~0xff)

9.2.34 void draw_ellipse(U8 ID,U16 x,U16 y,U16 xra,U16 yra,U8 r,U8 g,U8 b)

Draw a ellipse

Parameter:

ID：Current ID

x:0~ Horizontal resolution-1

y:0~ Vertical resolution-1

xra: Horizontal radius

yra: Vertical radius

r:red(0~0xff)

g:green(0~0xff)

b:blue(0~0xff)

9.2.35 void draw_ellipse_fill(U8 ID,U16 x,U16 y,U16 xra,U16 yra,U8 r,U8 g,U8 b)

Draw a ellipse fill

Parameter:

ID：Current ID

x:0~ Horizontal resolution-1

y:0~ Vertical resolution-1

xra: Horizontal radius

yra: Vertical radius

r:red(0~0xff)

g:green(0~0xff)
b:blue(0~0xff)

9.2.36 void picture_xy(U8 ID,U8 *filename,U16 x,U16 y)

Display pictures in the specified location .
Parameter:
ID：Current ID
**filename：pictures filename*
x:0~ Horizontal resolution-1
y:0~ Vertical resolution-1
*x,y:*Upper left corner of the corresponding picture

9.2.37 void pitrure_spread(U8 ID,U8 *filename,U16 x,U16 y,U8 s)

Spread around display pictures
Parameter:
ID：Current ID
**filename：pictures filename*
x:0~ Horizontal resolution-1
y:0~ Vertical resolution-1
x,y:Upper left corner of the corresponding picture

9.2.38 void picture_right_to_left(U8 ID,U8 *filename,U16 x,U16 y,U8 s)

Insert displayed from right to left
Parameter:
ID：Current ID
**filename：pictures filename*
x:0~ Horizontal resolution-1
y:0~ Vertical resolution-1
x,y:Upper left corner of the corresponding picture
s: Picture update rate, the smaller the value the slower speed

9.2.39 void picture_left_to_right(U8 ID,U8 *filename,U16 x,U16 y,U8 s)

Insert displayed from left to right
Parameter:
ID：Current ID
**filename：pictures filename*
x:0~ Horizontal resolution-1
y:0~ Vertical resolution-1
x,y:Upper left corner of the corresponding picture
s: Picture update rate, the smaller the value the slower speed

9.2.40 void picture_up_to_down (U8 ID,U8 *filename,U16 x,U16 y,U8 s)

Insert displayed from up to down
Parameter:
ID：Current ID
**filename：pictures filename*
x:0~ Horizontal resolution-1
y:0~ Vertical resolution-1
x,y:Upper left corner of the corresponding picture
s: Picture update rate, the smaller the value the slower speed

9.2.41 void picture_down_to_up (U8 ID,U8 *filename,U16 x,U16 y,U8 s)

Insert displayed from down to up

Parameter:

ID：Current ID

filename：pictures filename

x:0~ Horizontal resolution-1

y:0~ Vertical resolution-1

x,y:Upper left corner of the corresponding picture

s: Picture update rate, the smaller the value the slower speed

9.2.42 void picture_horizontally(U8 ID,U8 *filename,U16 x,U16 y,U8 s)

Laterally expanded display

Parameter:

ID：Current ID

filename：pictures filename

x:0~ Horizontal resolution-1

y:0~ Vertical resolution-1

x,y:Upper left corner of the corresponding picture

s: Picture update rate, the smaller the value the slower speed

9.2.43 void picture_vertical (U8 ID,U8 *filename,U16 x,U16 y,U8 s)

Longitudinally mounted display

Parameter:

ID：Current ID

filename：pictures filename

x:0~ Horizontal resolution-1

y:0~ Vertical resolution-1

x,y:Upper left corner of the corresponding picture

s: Picture update rate, the smaller the value the slower speed

9.2.44void picture_clip(U8 ID,U8 *filename,U16 x,U16 y,U16 lx,U16 ly,U16 w,U16 h)

Pictures Clip

Parameter:

ID：Current ID

filename：pictures filename

x:0~ Horizontal resolution of picture-1

y:0~ Vertical resolution of picture-1

lx:0~ Horizontal resolution of LCD-1

ly:0~ Vertical resolution of of LCD-1

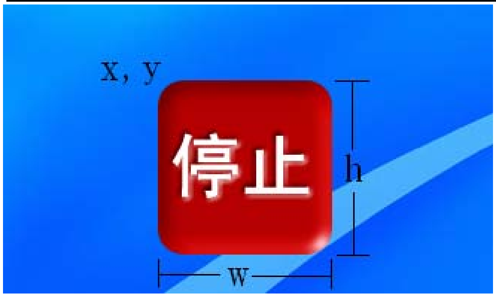
w:Clipping area width

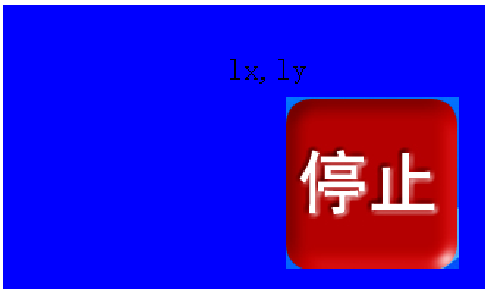
h:Clipping area height

Usage:

```
void main()
{
    picture_clip(ID,"1.bmp", x, y, lx,ly, w, h);// Clip "1.bmp" picture "Stop" is displayed
    while(1);                                   //on the LCD

}
```





Picture:1.bmp in memory LCD display

9.2.45 void picture_zom(U8 ID,U8 *filename,U16 x,U16 y,U16 w,U16 h)

Pictures Zoom

Parameter:

ID：Current ID

**filename：pictures filename*

x:0~ Horizontal resolution -1

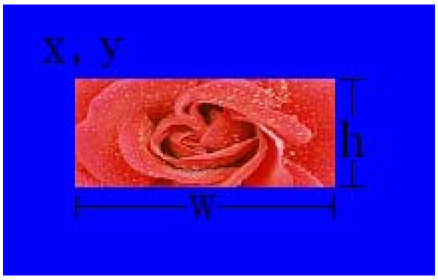
y:0~ Vertical resolution-1

w: Designated area width

h: Designated area height

Usage:

```
void main()
{
    picture_zoom(ID,"1.bmp", x, y, w, h);// 1.bmp" zoom display on the LCD designated
    while(1);                             //area
}
```



Picture:1.bmp in memory LCD display

9.2.46 void picture_best_show(U8 ID,U8 *filename,U16 x1,U16 y1,U16 x2,U16 y2)

Beset display in designated areas, Pictures with vertical and horizontal scaling displayed in designated areas.

Parameter:

ID：Current ID

**filename：pictures filename*

x1:0~ Horizontal resolution -1

y1:0~ Vertical resolution-1

x2:0~ Horizontal resolution -1

y2:0~ Vertical resolution-1

x1,y1 Specify the upper-left corner coordinates;x2,y2 The lower right corner coordinates designated area

9.2.47 void windows(U8 ID, U16 x,U16 y,U16 w,U16 h,U8 *name)

Windows forn UI

Parameter:

ID：Current ID

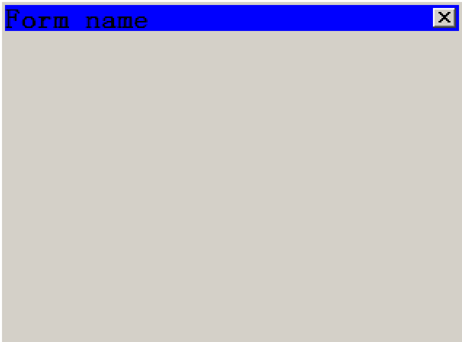
x:0~ Horizontal resolution -1

y:0~ Vertical resolution-1

w: width

h: height

**name:Form name*



9.2.48 void windows_click(U8 ID, U16 x,U16 y,U16 w,U16 h)

Click closed forms UI

Parameter:

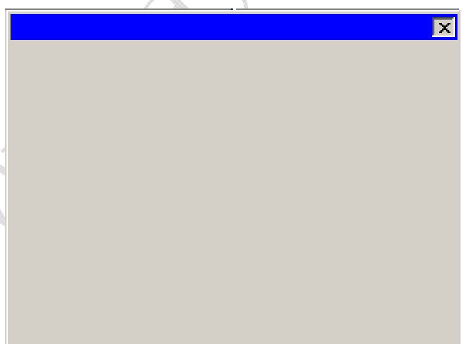
ID：Current ID

x:0~ Horizontal resolution -1

y:0~ Vertical resolution-1

w: width

h: height



9.2.49 void button(U8 ID, U16 x,U16 y,U16 w,U16 h)

Button UI

Parameter:

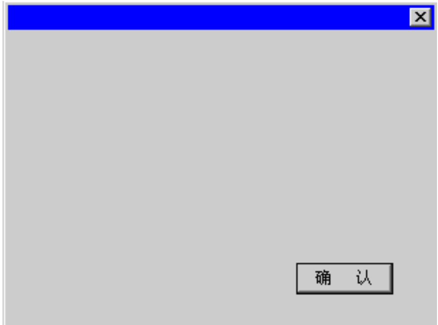
ID：Current ID

x:0~ Horizontal resolution -1

y:0~ Vertical resolution-1

w: width

h: height



9.2.50 void button_click(U8 ID, U16 x,U16 y,U16 w,U16 h)

Press the button UI

Parameter:

ID：Current ID

x:0~ Horizontal resolution -1

y:0~ Vertical resolution-1

w: width

h: height

9.2.51 void textbox(U8 ID, U16 x,U16 y,U16 w,U16 h)

Textbox UI

Parameter:

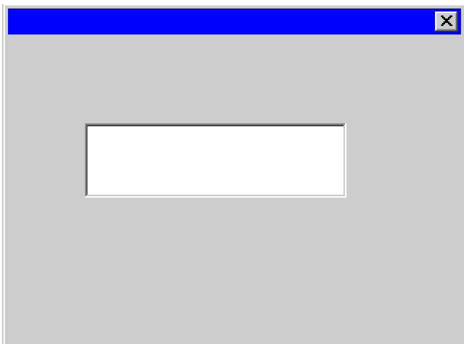
ID：Current ID

x:0~ Horizontal resolution -1

y:0~ Vertical resolution-1

w: width

h: height



9.2.52 void frame(U8 ID, U16 x,U16 y,U16 w,U16 h,U8 *name)

Frame UI

Parameter:

ID：Current ID

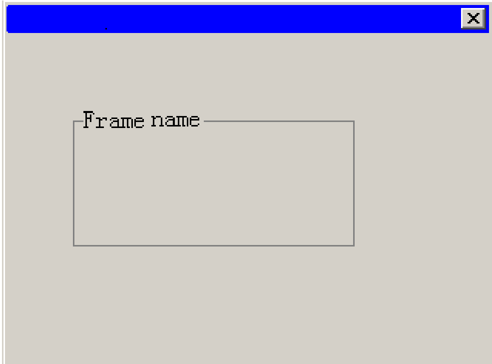
x:0~ Horizontal resolution -1

y:0~ Vertical resolution-1

w: width

h: height

**Frame name*



9.2.53 void touch_reset()

Touch parity, five points parity. Limited support for touch products.

9.2.54 void touch_press_down()

When pressed, the coordinate data sent via TXD. Limited support for touch products.

9.2.55void touch_loosen()

When Loosened, the coordinate data sent via TXD. Limited support for touch products.

9.2.56 0XAA 0X73 xh xl yh yl

Output command

Parameter:

xh: x coordinate[15:8]

xl: x coordinate[7:0]

yh: y coordinate[15:8]

yl: y coordinate[7:0]