Tailorpixels

A Professional Manufacturer of Display

Manufacturer Certificated

9001 CERT. No.: 282Q19070712006

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Product Specification

Model: TTH348BVT-02CG

3.48″TFT Display Module (172*640)

This module uses RoHS material

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Records of Revision 修改记录

Rev 版本号	Date 修改日期	Description 内容	Page 页	Remarks 注释
V0	2025/06/12	first	17	

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1 General Description 规格简介

This display module is a transmissive type color active matrix TFT(Thin Film Transistor) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This module is composed of a TFT LCD module, a driver circuit, and a back-light unit.The resolution of a 3.48" contains 172RGB x 640 dots and can display up to 16.7M colors.

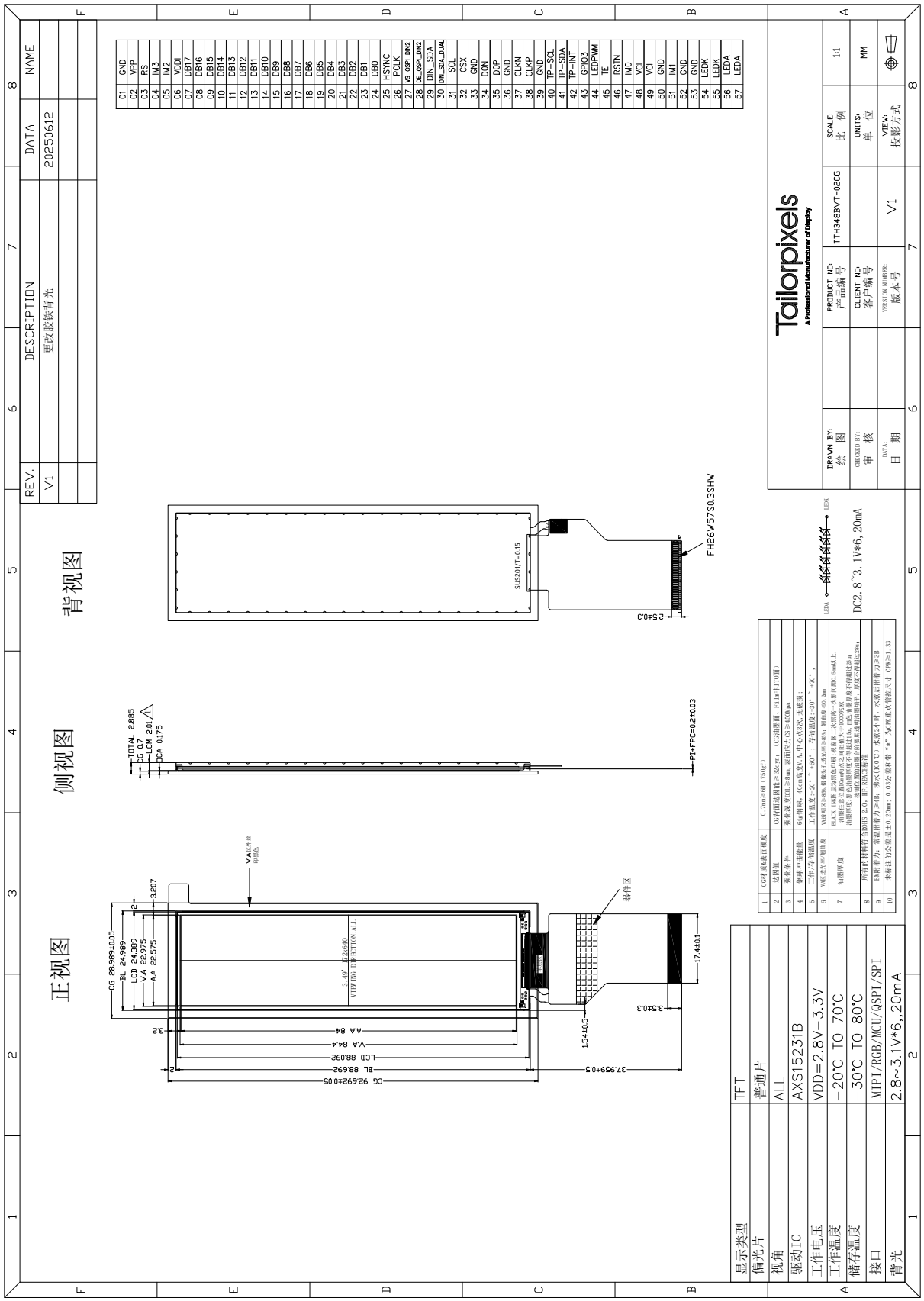
该显示模块是一种采用非晶硅 TFT 作为开关器件的透射型彩色有源矩阵 TFT(薄膜晶体管)液晶显示器。该模块由 TFT 液晶显示模块、驱动电路和背光单元组成。3.48 英寸的分辨率包含 172RGB x 640 点，可显示高达 16.7M 的颜色。

2 Module Parameter 模组参数

Features	Details	Unit
Display Size(Diagonal) 显示尺寸(对角线)	3.48	inch
LCD type 液晶显示屏类型	α-Si TFT	-
Display Mode 显示模式	IPS / Transmissive / Normally Black	-
Resolution 分辨率	172RGB x 640	-
Active Area 显示区	22.575(H)×84(V)	mm
Module Outline 模组外形	28.989(H) ×92.692(V)*2.885（T）	mm
Display Colors 显示颜色	16.7M	-
Interface 接口	MIPI/RGB/MCU/SPI/QSPI	-
Driver IC 驱动 IC	AXS15231B	-
TP Viewing Area TP 视窗	22.975(H)×84.4(V)	mm
CG Outline(assembly) 盖板外形	28.989(H) ×92.692(V)*0.7（T）	mm
Luminance on surface 亮度	350	cd/m²
View Direction 视角方向	All	Best image
Contrast ratio 对比度	1200:1	
Color gamut 色域	70%	
PPI 图像点密集度	193	-
Window effect 视窗效果	–	-
Cover plate surface effect 盖板表面效果	–	-
Operating Temperature 工作温度	-20～70	ºC
Storage Temperature 储存温度	-30～80	ºC
Weight 重量	TBD	g
搭配连接器	FH26W57S0.3SHW	

Note 1: Excluding hooks, posts , FPC/FPC tail etc.

3 Mechanical Drawings 结构图


正视图
侧视图
背视图
TFT
普通片
ALL
AXS15231B
VDD=2.8V~3.3V
-20°C TO 70°C
-30°C TO 80°C
MIPI/RGB/MCU/QSPI/SPI
2.8~3.1V*6,,20mA
DC2.8~3.1V*6, 20mA
FH26W-57S-0.3SHW
FPC-0240-03
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TTH348BVT-02CG
V1
1:1
MM
20250612
更改胶铁背光

4 Module Interface 模组接口定义

NO	SYMBOL	FUNCTION
1	GND	Power Ground
2	VPP	supply for OTP program
3	RS	command or parameter selection in spi 4wire 8bits.
4	IM3	
5	IM2	
6	IOVDD	Power Supply for logic, IOVDD=1.8V~3.3V.
7-24	DB17-DB0	DB[17:0] input data of rgb interface. DB[17:0] of 8080 mcu interface for command mode
25	HSYNC	Line synchronizing signal of rgb interface. Used as d/cx of 8080 mcu interface for command mode
26	PCLK	pixel clock signal of rgb interface. Used as rd of 8080 mcu interface for command mode
27	VS_QSPI_DIN2	Frame synchronizing signal of rgb interface. Used as csn of 8080 mcu interface for command mode
28	DE_QSPI_DIN2	Data enable signal of rgb interface. Used as wr of 8080 mcu interface for command mode.
29	DIN_SDA	The bidirectional data pin of spi slave. Default input. pull down to avoid floating. Output load 50pf.This pin is not used for MIPI I/F, please connect to VSSD.
30	DIN_SDA_DUAL	The second data input pin in spi dual data lane of spi slave.Default input.pull down to avoid floating.Output load 50pf.This pin is not used for MIPI I/F,please connect to VSSD.
31	SCL	Synchronous clock signal in SPI slave, pull up to avoid floating. This pin is not used for MIPI I/F, please connect to VDD.
32	CSX	Chip select input pin("Low" enable) in SPI slave ,pull up to avoid floating. This pin is not used for MIPI I/F, please connect to VDDI.
33	GND	Power Ground
34	D0N	MIPI DSI differential data pair. (Data lane 0 negative polarity)
35	D0P	MIPI DSI differential data pair. (Data lane 0 positive polarity)
36	GND	Power Ground
37	CLKN	CLKN
38	CLKP	CLKP
39	GND	Power Ground
40	TP-SCL	Touch panel I2C clock.If not used, open this pin

41	TP-SDA	Touch panel I2C data.If not used, open this pin
42	TP-INT	Touch panel interrupt output.If not used, open this pin
43	GPIO3	work for I2C interface clock or data as I2C master,when WORK_MODE=0;GPIO[1:0] only used for I2C slave interface; GPIO[7:4] can used for spi master interface of flash or other function.
44	LEDPWM	Backlight control setting pin.Output load 50pf
45	TE	output tearing effect signal from IC to host
46	RSTN	This signal will reset the device and must be applied to properly initialize the chip.Signal is active low.pull up to avoid floating.
47	IM0	
48	VCI	Power Supply . VCI=2.8V~3.3V
49	VCI	Power Supply . VCI=2.8V~3.3V
50	GND	Power Ground
51	IM1	
52	GND	Power Ground
53	GND	Power Ground
54	LEDK	LED Cathode
55	LEDK	LED Cathode
56	LEDA	LED Anode
57	LEDA	LED Anode
	IM3-IM0	select the input interface 1010:QSPI 1001:spi 3 wire 9bits dual data lane from driver spi 1000:dbi 18bits; 0111:dbi 16bits; 0110:dbi 9bits; 0101:dbi 8bits; 0100:spi 4Wire 8bits dual data lane; 0011:spi 3wire 9bits+rgb 0010:spi 4wire 8bits+rgb 0000:mipi

5 Application Circuit 应用电路

5.1 Backlight recommended circuit 背光电路参考

TBD

5.2Backlight recommended circuit 背光电路参数推荐

Motherboard driver backlight is need constant current circuit:

DC2.8~3.1V*6,20mA

6 灯串联

Note: constant current circuit for every LED,and though LED lamp current is less than 20mA.Recommand between 15mA and 20 mA for every LED.

5.3 Application Circuit 应用电路（）

6 Absolute Maximum Ratings 绝对最大额定值

VSS=0V, Ta=25ºC

Item 项目		Symbol	Min.最小	Max.最大	Unit 单位
Supply Voltage 电源电压	Power supply 电力供应	VCI	-0.3	+4.6	V
	Analog 模拟	-	-	-	V
	IO	IOVDD	-0.3	+4.6	V
Input Voltage 输入电压		Vi	-0.3	IOVDD+0.3	V
Storage temperature 储存温度		T_{stg}	-30	+80	ºC
Operating temperature 工作温度		T_{op}	-20	+70	ºC
Storage humidity 存储湿度		H_{stg}	10	Note 1	%RH
Operating humidity 操作湿度		H_{op}	10	Note 1	%RH

Note 1: 90%RH max, If Ta is below 50ºC; 60%RH max, If Ta is over 60ºC.

7 Electrical Specification 电性规格

DC Characteristics 直流特性

Item 项目		Symbol	Min.最小	Typ.中间	Max.最大	Unit 单位
Supply Voltage 电源电压	Powersupply 电力供应	VCI	-	2.8	3.3	V
	Analog	-	-	-	-	V
	IO	IOVDD	1.65	1.8/2.8	3.3	V
Logic Low input voltage 输入低电平		V_{IL}	VSS	-	0.3IOVDD	V
Logic High input voltage 输入高电平		V_{IH}	0.7IOVDD	-	IOVDD	V
Logic Low output voltage 输出低电平		V_{OL}	VSS	-	0.3IOVDD	V
Logic High output voltage 输出高电平		V_{OH}	0.7IOVDD	-	IOVDD	V
Current Consumption 电流消耗	Normal display 正常的显示	Ivdd	-	30	-	mA
	Standby mode 待机模式	Ivdd	-	60	-	uA
Frame Frequency 帧频		f_{FR}	-	60	-	Hz

8 Initialization Code 初始化代码

```
                                        ////////////////////////////////////////////////
                                        ////////////////////////////////
RESET(1);
En18V(1);
Delay(100);                             ////////?yH porch ?y////////
EnVCI(1);                               loadWidthSet(172);
Delay(100);                             loadHBPSet(155);
EnVSP(0);                               loadHFPSet(155);
EnVSN(0);                               loadHSWSet(60);
EnBLT(1);                               ////////?üH porch ?ü///////
                                        ////////?yV porch ?y///////
                                        loadHeightSet(640);
RESET(1);                               loadVBPSet(100);
Delay(130);                             loadVFPSet(22);
RESET(0);                               loadVSWSet(25);
Delay(130);                             ////////?üV porch ?ü///////
RESET(1);                               loadDCLKSet(26);      //DClK
Delay(220);                             loadInvVsync(0);      //Invert VS
                                        loadInvHsync(0);      //Invert HS
///////NOW is Forward Scan, Need       loadInvDCLK(0);       //Invert
to reflash some Reg if need             DCLK
Reverse Scan //////////                  loadInvDE(0);         //Invert
//   D0:par18: 40->C0                   DE
//   D5:par14: D3->F3;                  loadLanes(0);         //lane
```

```
Number
loadRefreshMode(0); //0=Video
1=Command
loadOutFormat(0);     //888=0
666=1   565=2
loadSwapRGB(0);
//default=0   R/B=1   R/G=2
G/B=3
loadHSCLK(614);        //MIPI
Rate     SPI3W9B=10
SPI4W8B=11 SPI3WDUAL=12
SPI4BDUAL=13
SPI4BDUAL1=14
SPI4BDUAL2=15
SPI4BDUAL3=16
loadScreenType(0);   //MIPI=0
DUALMIPI=1 RGB=2 LVDS=3
Simu SSPI=4 Single SPI=5 dual
SPI=6 QUAD SPI=7 MCU8bit=8
MCU16bit=9
loadCompressionType(0);//no
compression =0   DSC=1 1/2=2

////////// LCD init code
//////////////////

DataType(0x29);
WriteAddr(0xBB);
WriteData(0x00);//0
WriteData(0x00);//1
WriteData(0x00);//2
WriteData(0x00);//3
WriteData(0x00);//4
WriteData(0x00);//5
WriteData(0x5A);//6
WriteData(0xA5);//7


DataType(0x29);
WriteAddr(0xA0);
WriteData(0x00);//0
WriteData(0x30);//1
WriteData(0x00);//2
WriteData(0x02);//3
WriteData(0x00);//4
WriteData(0x00);//5
WriteData(0x04);//6
WriteData(0x3F);//7
WriteData(0x20);//8
WriteData(0x05);//9
WriteData(0x3F);//10
WriteData(0x3F);//11
WriteData(0x00);//12
WriteData(0x00);//13
WriteData(0x00);//14
WriteData(0x00);//15
WriteData(0x00);//16


DataType(0x29);
WriteAddr(0xA2);
WriteData(0x20);//0
WriteData(0x19);//1
WriteData(0x60);//2
WriteData(0x64);//3
WriteData(0x9b);//4
WriteData(0x22);//5
WriteData(0x50);//6
WriteData(0x80);//7
WriteData(0xAC);//8
WriteData(0x28);//9
WriteData(0x7F);//10
WriteData(0x7F);//11
WriteData(0x7F);//12
WriteData(0x20);//13
WriteData(0xF8);//14
WriteData(0x10);//15
WriteData(0x02);//16
WriteData(0xFF);//17
WriteData(0xFF);//18
WriteData(0xF0);//19
WriteData(0x90);//20
```

```
WriteData(0x01);//21
WriteData(0x32);//22
WriteData(0xA0);//23
WriteData(0x91);//24
WriteData(0xC0);//25
WriteData(0x10);//26
WriteData(0x7F);//27
WriteData(0xFF);//28
WriteData(0x00);//29
WriteData(0x04);//30


DataType(0x29);
WriteAddr(0xD0);
WriteData(0x80);//0
WriteData(0xAC);//1
WriteData(0x21);//2
WriteData(0x24);//3
WriteData(0x08);//4
WriteData(0x09);//5
WriteData(0x10);//6
WriteData(0x01);//7
WriteData(0x80);//8
WriteData(0x12);//9
WriteData(0xC2);//10
WriteData(0x00);//11
WriteData(0x22);//12
WriteData(0x22);//13
WriteData(0xAA);//14
WriteData(0x03);//15
WriteData(0x10);//16
WriteData(0x12);//17
WriteData(0x40);//18
WriteData(0x14);//19
WriteData(0x1E);//20
WriteData(0x51);//21
WriteData(0x15);//22
WriteData(0x00);//23
WriteData(0x40);//24
WriteData(0x10);//25
WriteData(0x00);//26
WriteData(0x03);//27
WriteData(0x3D);//28
WriteData(0x12);//29


DataType(0x29);
WriteAddr(0xA3);
WriteData(0xA0);//0
WriteData(0x06);//1
WriteData(0xA9);//2
WriteData(0x08);//3
WriteData(0x08);//4
WriteData(0x02);//5
WriteData(0x0A);//6
WriteData(0x04);//7
WriteData(0x04);//8
WriteData(0x04);//9
WriteData(0x04);//10
WriteData(0x04);//11
WriteData(0x04);//12
WriteData(0x04);//13
WriteData(0x04);//14
WriteData(0x04);//15
WriteData(0x04);//16
WriteData(0x04);//17
WriteData(0x04);//18
WriteData(0x00);//19
WriteData(0x55);//20
WriteData(0x55);//21


DataType(0x29);
WriteAddr(0xC1);
WriteData(0x31);//0
WriteData(0x04);//1
WriteData(0x02);//2
WriteData(0x02);//3
WriteData(0x71);//4
WriteData(0x05);//5
WriteData(0x24);//6
WriteData(0x55);//7
```

```
WriteData(0x02);//8
WriteData(0x00);//9
WriteData(0x41);//10
WriteData(0x01);//11
WriteData(0x53);//12
WriteData(0xFF);//13
WriteData(0xFF);//14
WriteData(0xFF);//15
WriteData(0x4F);//16
WriteData(0x52);//17
WriteData(0x00);//18
WriteData(0x4F);//19
WriteData(0x52);//20
WriteData(0x00);//21
WriteData(0x45);//22
WriteData(0x3B);//23
WriteData(0x0B);//24
WriteData(0x02);//25
WriteData(0x0D);//26
WriteData(0x00);//27
WriteData(0xFF);//28
WriteData(0x40);//29


DataType(0x29);
WriteAddr(0xC3);
WriteData(0x00);//0
WriteData(0x00);//1
WriteData(0x00);//2
WriteData(0x50);//3
WriteData(0x03);//4
WriteData(0x00);//5
WriteData(0x00);//6
WriteData(0x00);//7
WriteData(0x01);//8
WriteData(0x80);//9
WriteData(0x01);//10


DataType(0x29);
WriteAddr(0xC4);
WriteData(0x00);//0
WriteData(0x24);//1
WriteData(0x33);//2
WriteData(0x90);//3
WriteData(0x13);//4
WriteData(0xea);//5
WriteData(0x64);//6
WriteData(0x32);//7
WriteData(0xC8);//8
WriteData(0x64);//9
WriteData(0xC8);//10
WriteData(0x32);//11
WriteData(0x90);//12
WriteData(0x90);//13
WriteData(0x11);//14
WriteData(0x06);//15
WriteData(0xDC);//16
WriteData(0xFA);//17
WriteData(0x04);//18
WriteData(0x03);//19
WriteData(0x80);//20
WriteData(0xFE);//21
WriteData(0x10);//22
WriteData(0x10);//23
WriteData(0x00);//24
WriteData(0x0A);//25
WriteData(0x0A);//26
WriteData(0x44);//27
WriteData(0x50);//28

DataType(0x29);
WriteAddr(0xC5);
WriteData(0x18);//0
WriteData(0x00);//1
WriteData(0x00);//2
WriteData(0x03);//3
WriteData(0xFE);//4
WriteData(0x08);//5
WriteData(0x68);//6
WriteData(0x30);//7
WriteData(0x30);//8
```

```
WriteData(0x10);//9
WriteData(0x88);//10
WriteData(0xDE);//11
WriteData(0x0D);//12
WriteData(0x08);//13
WriteData(0x0F);//14
WriteData(0x0F);//15
WriteData(0x01);//16
WriteData(0x08);//17
WriteData(0x68);//18
WriteData(0x30);//19
WriteData(0x10);//20
WriteData(0x10);//21
WriteData(0x00);//22


DataType(0x29);
WriteAddr(0xC6);
WriteData(0x05);//0
WriteData(0x0A);//1
WriteData(0x05);//2
WriteData(0x0A);//3
WriteData(0x00);//4
WriteData(0xE0);//5
WriteData(0x2E);//6
WriteData(0x0B);//7
WriteData(0x12);//8
WriteData(0x22);//9
WriteData(0x12);//10
WriteData(0x22);//11
WriteData(0x01);//12
WriteData(0x00);//13
WriteData(0x00);//14
WriteData(0x02);//15
WriteData(0x6A);//16
WriteData(0x18);//17
WriteData(0xC8);//18
WriteData(0x22);//19


DataType(0x29);
WriteAddr(0xC7);
WriteData(0x50);//0
WriteData(0x36);//1
WriteData(0x28);//2
WriteData(0x00);//3
WriteData(0xa2);//4
WriteData(0x80);//5
WriteData(0x8f);//6
WriteData(0x00);//7
WriteData(0x80);//8
WriteData(0xff);//9
WriteData(0x07);//10
WriteData(0x11);//11
WriteData(0x9c);//12
WriteData(0x6f);//13
WriteData(0xff);//14
WriteData(0x24);//15
WriteData(0x0c);//16
WriteData(0x0d);//17
WriteData(0x0e);//18
WriteData(0x0f);//19


DataType(0x29);
WriteAddr(0xC9);
WriteData(0x33);//0
WriteData(0x44);//1
WriteData(0x44);//2
WriteData(0x01);//3


DataType(0x29);
WriteAddr(0xCF);
WriteData(0x34);//0
WriteData(0x1E);//1
WriteData(0x88);//2
WriteData(0x58);//3
WriteData(0x13);//4
WriteData(0x18);//5
WriteData(0x56);//6
WriteData(0x18);//7
```

```
WriteData(0x1E);//8
WriteData(0x68);//9
WriteData(0xF8);//10
WriteData(0x00);//11
WriteData(0x66);//12
WriteData(0x0d);//13
WriteData(0x22);//14
WriteData(0xC4);//15
WriteData(0x0C);//16
WriteData(0x77);//17
WriteData(0x22);//18
WriteData(0x44);//19
WriteData(0xAA);//20
WriteData(0x55);//21
WriteData(0x04);//22
WriteData(0x04);//23
WriteData(0x12);//24
WriteData(0xA0);//25
WriteData(0x08);//26

DataType(0x29);
WriteAddr(0xD5);
WriteData(0x10);//0
WriteData(0x61);//1
WriteData(0x89);//2
WriteData(0x00);//3
WriteData(0x35);//4
WriteData(0x04);//5
WriteData(0x73);//6
WriteData(0x03);//7
WriteData(0x03);//8
WriteData(0x73);//9
WriteData(0x03);//10
WriteData(0x03);//11
WriteData(0x04);//12
WriteData(0x03);//13
WriteData(0x13);//14
WriteData(0x46);//15
WriteData(0x13);//16
WriteData(0x60);//17
WriteData(0x13);//18
WriteData(0x60);//19
WriteData(0x86);//20
WriteData(0x00);//21
WriteData(0x00);//22
WriteData(0x00);//23
WriteData(0x80);//24
WriteData(0x52);//25
WriteData(0x7D);//26
WriteData(0x10);//27
WriteData(0x10);//28
WriteData(0x00);//29


DataType(0x29);
WriteAddr(0xD6);
WriteData(0x10);//0
WriteData(0x32);//1
WriteData(0x54);//2
WriteData(0x76);//3
WriteData(0x98);//4
WriteData(0xBA);//5
WriteData(0xDC);//6
WriteData(0xFE);//7
WriteData(0x00);//8
WriteData(0x00);//9
WriteData(0x01);//10
WriteData(0x83);//11
WriteData(0x04);//12
WriteData(0x04);//13
WriteData(0x33);//14
WriteData(0x04);//15
WriteData(0x04);//16
WriteData(0x33);//17
WriteData(0x60);//18
WriteData(0x60);//19
WriteData(0x60);//20
WriteData(0x60);//21
WriteData(0x61);//22
WriteData(0x60);//23
```

```
WriteData(0x00);//24
WriteData(0xA4);//25
WriteData(0x51);//26
WriteData(0x23);//27
WriteData(0x01);//28
WriteData(0x00);//29

DataType(0x29);
WriteAddr(0xD7);//CG
WriteData(0x18);//0
WriteData(0x1A);//1
WriteData(0x1B);//2
WriteData(0x1F);//3
WriteData(0x0A);//4
WriteData(0x08);//5
WriteData(0x0E);//6
WriteData(0x0C);//7
WriteData(0x00);//8
WriteData(0x1F);//9
WriteData(0x1d);//10
WriteData(0x1F);//11
WriteData(0x10);//12
WriteData(0x61);//13
WriteData(0x04);//14
WriteData(0x00);//15
WriteData(0x1F);//16
WriteData(0x00);//17
WriteData(0x1F);//18

DataType(0x29);
WriteAddr(0xD8);//CG
WriteData(0x18);//0
WriteData(0x1A);//1
WriteData(0x1B);//2
WriteData(0x1f);//3
WriteData(0x0B);//4
WriteData(0x09);//5
WriteData(0x0F);//6
WriteData(0x0D);//7
WriteData(0x01);//8
WriteData(0x1F);//9
WriteData(0x1D);//10
WriteData(0x1F);//11

DataType(0x29);
WriteAddr(0xD9);
WriteData(0x0F);//1
WriteData(0x09);//2
WriteData(0x0B);//3
WriteData(0x1F);//4
WriteData(0x18);//5
WriteData(0x19);//6
WriteData(0x1F);//7
WriteData(0x01);//8
WriteData(0x1E);//9
WriteData(0x1D);//10
WriteData(0x1F);//11

DataType(0x29);
WriteAddr(0xDD);
WriteData(0x0E);//1
WriteData(0x08);//2
WriteData(0x0A);//3
WriteData(0x1F);//4
WriteData(0x18);//5
WriteData(0x19);//6
WriteData(0x1F);//7
WriteData(0x00);//8
WriteData(0x1E);//9
WriteData(0x1A);//10
WriteData(0x1F);//11

DataType(0x29);
WriteAddr(0xDF);
WriteData(0x44);//0
WriteData(0x63);//1
WriteData(0x4B);//2
```

```
WriteData(0x69);//3
WriteData(0x00);//4
WriteData(0x0A);//5
WriteData(0x02);//6
WriteData(0x90);//7

////////////////2.2
DataType(0x29);
WriteAddr(0xE0);
WriteData(0x35);//0
WriteData(0x08);//1
WriteData(0x1B);//2
WriteData(0x1F);//3
WriteData(0x0F);//4
WriteData(0x0C);//5
WriteData(0x14);//6
WriteData(0x2C);//7
WriteData(0x54);//8
WriteData(0x22);//9
WriteData(0x0C);//10
WriteData(0x16);//11
WriteData(0x14);//12
WriteData(0x25);//13
WriteData(0x27);//14
WriteData(0x08);//15
WriteData(0x00);//16


DataType(0x29);
WriteAddr(0xE1);
WriteData(0x3e);//0
WriteData(0x08);//1
WriteData(0x1B);//2
WriteData(0x1F);//3
WriteData(0x0F);//4
WriteData(0x0C);//5
WriteData(0x14);//6
WriteData(0x2C);//7
WriteData(0x54);//8
WriteData(0x22);//9
WriteData(0x0C);//10
WriteData(0x16);//11
WriteData(0x14);//12
WriteData(0x25);//13
WriteData(0x27);//14
WriteData(0x08);//15
WriteData(0x0f);//16


/////gamma 2.0/////
DataType(0x29);
WriteAddr(0xE2);
WriteData(0x19);//0
WriteData(0x20);//1
WriteData(0x0A);//2
WriteData(0x11);//3
WriteData(0x09);//4
WriteData(0x06);//5
WriteData(0x11);//6
WriteData(0x25);//7
WriteData(0xD4);//8
WriteData(0x22);//9
WriteData(0x0B);//10
WriteData(0x13);//11
WriteData(0x12);//12
WriteData(0x2D);//13
WriteData(0x32);//14
WriteData(0x2f);//15
WriteData(0x03);//16


DataType(0x29);
WriteAddr(0xE3);
WriteData(0x38);//0
WriteData(0x20);//1
WriteData(0x0A);//2
WriteData(0x11);//3
WriteData(0x09);//4
WriteData(0x06);//5
WriteData(0x11);//6
WriteData(0x25);//7
```

```
WriteData(0xC4);//8
WriteData(0x21);//9
WriteData(0x0A);//10
WriteData(0x12);//11
WriteData(0x11);//12
WriteData(0x2C);//13
WriteData(0x32);//14
WriteData(0x2f);//15
WriteData(0x27);//16


DataType(0x29);
WriteAddr(0xE4);
WriteData(0x19);//0
WriteData(0x20);//1
WriteData(0x0D);//2
WriteData(0x14);//3
WriteData(0x0D);//4
WriteData(0x08);//5
WriteData(0x12);//6
WriteData(0x2A);//7
WriteData(0xD4);//8
WriteData(0x26);//9
WriteData(0x0E);//10
WriteData(0x15);//11
WriteData(0x13);//12
WriteData(0x34);//13
WriteData(0x39);//14
WriteData(0x2f);//15
WriteData(0x03);//16


DataType(0x29);
WriteAddr(0xE5);
WriteData(0x38);//0
WriteData(0x20);//1
WriteData(0x0D);//2
WriteData(0x13);//3
WriteData(0x0D);//4
WriteData(0x07);//5
WriteData(0x12);//6
WriteData(0x29);//7
WriteData(0xC4);//8
WriteData(0x25);//9
WriteData(0x0D);//10
WriteData(0x15);//11
WriteData(0x12);//12
WriteData(0x33);//13
WriteData(0x39);//14
WriteData(0x2f);//15
WriteData(0x27);//16


DataType(0x29);
WriteAddr(0xBB);
WriteData(0x00);//0
WriteData(0x00);//1
WriteData(0x00);//2
WriteData(0x00);//3
WriteData(0x00);//4
WriteData(0x00);//5
WriteData(0x00);//6
WriteData(0x00);//7


DataType(0x05);
WriteAddr(0x11);
Delay(200);


DataType(0x05);
WriteAddr(0x29);
Delay(100);
```

spi 或者 mcu 接口代码

```
RESET(1);
En18V(1);
Delay(100);
EnVCI(1);
Delay(100);
EnVSP(0);
EnVSN(0);
EnBLT(1);


RESET(1);
Delay(130);
RESET(0);
Delay(130);
RESET(1);
Delay(220);

///////NOW is Forward Scan, Need to reflash some Reg if need Reverse Scan ///////////
//    D0:par18: 40->C0
//    D5:par14: D3->F3;
//////////////////////////////////////////////////////////////////////////////////


////////?yH porch ?y////////
loadWidthSet(172);
loadHBPSet(155);
loadHFPSet(155);
loadHSWSet(60);
////////?üH porch ?ü///////
////////?yV porch ?y///////
loadHeightSet(640);
loadVBPSet(100);
loadVFPSet(150);
loadVSWSet(25);
////////?üV porch ?ü///////
loadDCLKSet(30);       //DClK
```

```
loadInvVsync(0);       //Invert VS
loadInvHsync(0);       //Invert HS
loadInvDCLK(0);         //Invert DCLK
loadInvDE(0);           //Invert DE
loadLanes(0);           //lane Number
loadRefreshMode(1); //0=Video 1=Command
loadOutFormat(2);     //888=0    666=1    565=2
loadSwapRGB(0);         //defult=0    R/B=1    R/G=2    G/B=3
loadHSCLK(190);         //MIPI Rate      SPI3W9B=10 SPI4W8B=11
SPI3WDUAL=12 SPI4BDUAL=13 SPI4BDUAL1=14
SPI4BDUAL2=15 SPI4BDUAL3=16
loadScreenType(11);    //MIPI=0 DUALMIPI=1 RGB=2 LVDS=3 Simu
SSPI=4 Single SPI=5 dual SPI=6 QUAD SPI=7 MCU8bit=8
MCU16bit=9
loadCompressionType(0);//no compression =0    DSC=1 1/2=2

////////// LCD init code //////////////////

WriteAddr(0x02);
WriteData(0x00);
WriteData(0xBB);
WriteData(0x00);
WriteData(0x00);//0
WriteData(0x00);//1
WriteData(0x00);//2
WriteData(0x00);//3
WriteData(0x00);//4
WriteData(0x00);//5
WriteData(0x5A);//6
WriteData(0xA5);//7


WriteAddr(0x02);
WriteData(0x00);
WriteData(0xCA);
WriteData(0x00);
WriteData(0x21);//0
WriteData(0x36);//1
WriteData(0x00);//2
WriteData(0x22);//3
```

```
WriteAddr(0x02);
WriteData(0x00);
WriteData(0xA0);
WriteData(0x00);
WriteData(0x00);//0
WriteData(0x30);//1
WriteData(0x00);//2
WriteData(0x02);//3
WriteData(0x00);//4
WriteData(0x00);//5
WriteData(0x04);//6
WriteData(0x3F);//7
WriteData(0x20);//8
WriteData(0x05);//9
WriteData(0x3F);//10
WriteData(0x3F);//11
WriteData(0x00);//12
WriteData(0x00);//13
WriteData(0x00);//14
WriteData(0x00);//15
WriteData(0x00);//16

WriteAddr(0x02);
WriteData(0x00);
WriteData(0xA2);
WriteData(0x00);
WriteData(0x30);//0
WriteData(0x19);//1
WriteData(0x60);//2
WriteData(0x64);//3
WriteData(0x9b);//4
WriteData(0x22);//5
WriteData(0x50);//6
WriteData(0x80);//7
WriteData(0xAC);//8
WriteData(0x28);//9
WriteData(0x7F);//10
WriteData(0x7F);//11
WriteData(0x7F);//12
WriteData(0x20);//13
```

```
WriteData(0xF8);//14
WriteData(0x10);//15
WriteData(0x02);//16
WriteData(0xFF);//17
WriteData(0xFF);//18
WriteData(0xF0);//19
WriteData(0x90);//20
WriteData(0x01);//21
WriteData(0x32);//22
WriteData(0xA0);//23
WriteData(0x91);//24
WriteData(0xC0);//25
WriteData(0x20);//26
WriteData(0x7F);//27
WriteData(0xFF);//28
WriteData(0x00);//29
WriteData(0x04);//30

WriteAddr(0x02);
WriteData(0x00);
WriteData(0xD0);
WriteData(0x00);
WriteData(0x80);//0
WriteData(0xAC);//1
WriteData(0x21);//2
WriteData(0x24);//3
WriteData(0x08);//4
WriteData(0x09);//5
WriteData(0x10);//6
WriteData(0x01);//7
WriteData(0x80);//8
WriteData(0x12);//9
WriteData(0xC2);//10
WriteData(0x00);//11
WriteData(0x22);//12
WriteData(0x22);//13
WriteData(0xAA);//14
WriteData(0x03);//15
WriteData(0x10);//16
WriteData(0x12);//17
WriteData(0x40);//18
```

```
WriteData(0x14);//19
WriteData(0x1E);//20
WriteData(0x51);//21
WriteData(0x15);//22
WriteData(0x00);//23
WriteData(0x40);//24
WriteData(0x10);//25
WriteData(0x00);//26
WriteData(0x03);//27
WriteData(0x7D);//28
WriteData(0x12);//29


WriteAddr(0x02);
WriteData(0x00);
WriteData(0xA3);
WriteData(0x00);
WriteData(0xA0);//0
WriteData(0x06);//1
WriteData(0xA9);//2
WriteData(0x00);//3
WriteData(0x08);//4
WriteData(0x02);//5
WriteData(0x0A);//6
WriteData(0x04);//7
WriteData(0x04);//8
WriteData(0x04);//9
WriteData(0x04);//10
WriteData(0x04);//11
WriteData(0x04);//12
WriteData(0x04);//13
WriteData(0x04);//14
WriteData(0x04);//15
WriteData(0x04);//16
WriteData(0x04);//17
WriteData(0x04);//18
WriteData(0x00);//19
WriteData(0x55);//20
WriteData(0x55);//21
```

```
WriteAddr(0x02);
WriteData(0x00);
WriteData(0xC1);
WriteData(0x00);
WriteData(0x31);//0
WriteData(0x04);//1
WriteData(0x02);//2
WriteData(0x02);//3
WriteData(0x71);//4
WriteData(0x05);//5
WriteData(0x24);//6
WriteData(0x55);//7
WriteData(0x02);//8
WriteData(0x00);//9
WriteData(0x41);//10
WriteData(0x01);//11
WriteData(0x53);//12
WriteData(0xFF);//13
WriteData(0xFF);//14
WriteData(0xFF);//15
WriteData(0x4F);//16
WriteData(0x52);//17
WriteData(0x00);//18
WriteData(0x4F);//19
WriteData(0x52);//20
WriteData(0x00);//21
WriteData(0x45);//22
WriteData(0x3B);//23
WriteData(0x0B);//24
WriteData(0x02);//25
WriteData(0x0D);//26
WriteData(0x00);//27
WriteData(0xFF);//28
WriteData(0x40);//29


WriteAddr(0x02);
WriteData(0x00);
WriteData(0xC3);
WriteData(0x00);
WriteData(0x00);//0
```

```
WriteData(0x00);//1
WriteData(0x00);//2
WriteData(0x50);//3
WriteData(0x03);//4
WriteData(0x00);//5
WriteData(0x00);//6
WriteData(0x00);//7
WriteData(0x01);//8
WriteData(0x80);//9
WriteData(0x01);//10


WriteAddr(0x02);
WriteData(0x00);
WriteData(0xC4);
WriteData(0x00);
WriteData(0x00);//0
WriteData(0x24);//1
WriteData(0x33);//2
WriteData(0x80);//3
WriteData(0x11);//4
WriteData(0xea);//5
WriteData(0x64);//6
WriteData(0x32);//7
WriteData(0xC8);//8
WriteData(0x64);//9
WriteData(0xC8);//10
WriteData(0x32);//11
WriteData(0x90);//12
WriteData(0x90);//13
WriteData(0x11);//14
WriteData(0x06);//15
WriteData(0xDC);//16
WriteData(0xFA);//17
WriteData(0x00);//18
WriteData(0x00);//19
WriteData(0x80);//20
WriteData(0xFE);//21
WriteData(0x10);//22
WriteData(0x10);//23
WriteData(0x00);//24
```

```
WriteData(0x0A);//25
WriteData(0x0A);//26
WriteData(0x44);//27
WriteData(0x50);//28

WriteAddr(0x02);
WriteData(0x00);
WriteData(0xC5);
WriteData(0x00);
WriteData(0x18);//0
WriteData(0x00);//1
WriteData(0x00);//2
WriteData(0x03);//3
WriteData(0xFE);//4
WriteData(0x08);//5
WriteData(0x68);//6
WriteData(0x30);//7
WriteData(0x10);//8
WriteData(0x10);//9
WriteData(0x88);//10
WriteData(0xDE);//11
WriteData(0x0D);//12
WriteData(0x08);//13
WriteData(0x0F);//14
WriteData(0x0F);//15
WriteData(0x01);//16
WriteData(0x08);//17
WriteData(0x68);//18
WriteData(0x30);//19
WriteData(0x10);//20
WriteData(0x10);//21
WriteData(0x00);//22


WriteAddr(0x02);
WriteData(0x00);
WriteData(0xC6);
WriteData(0x00);
WriteData(0x05);//0
WriteData(0x0A);//1
WriteData(0x05);//2
```

```
WriteData(0x0A);//3
WriteData(0x00);//4
WriteData(0xE0);//5
WriteData(0x2E);//6
WriteData(0x0B);//7
WriteData(0x12);//8
WriteData(0x22);//9
WriteData(0x12);//10
WriteData(0x22);//11
WriteData(0x01);//12
WriteData(0x00);//13
WriteData(0x00);//14
WriteData(0x02);//15
WriteData(0x6A);//16
WriteData(0x18);//17
WriteData(0xC8);//18
WriteData(0x22);//19


WriteAddr(0x02);
WriteData(0x00);
WriteData(0xC7);
WriteData(0x00);
WriteData(0x50);//0
WriteData(0x36);//1
WriteData(0x28);//2
WriteData(0x00);//3
WriteData(0xa2);//4
WriteData(0x80);//5
WriteData(0x8f);//6
WriteData(0x00);//7
WriteData(0x80);//8
WriteData(0xff);//9
WriteData(0x07);//10
WriteData(0x11);//11
WriteData(0x9c);//12
WriteData(0x6f);//13
WriteData(0xff);//14
WriteData(0x24);//15
WriteData(0x0c);//16
WriteData(0x0d);//17
```

```
WriteData(0x0e);//18
WriteData(0x0f);//19


WriteAddr(0x02);
WriteData(0x00);
WriteData(0xC9);
WriteData(0x00);
WriteData(0x33);//0
WriteData(0x44);//1
WriteData(0x44);//2
WriteData(0x01);//3


WriteAddr(0x02);
WriteData(0x00);
WriteData(0xCF);
WriteData(0x00);
WriteData(0x2C);//0
WriteData(0x1E);//1
WriteData(0x88);//2
WriteData(0x58);//3
WriteData(0x13);//4
WriteData(0x18);//5
WriteData(0x56);//6
WriteData(0x18);//7
WriteData(0x1E);//8
WriteData(0x68);//9
WriteData(0xF8);//10
WriteData(0x00);//11
WriteData(0x66);//12
WriteData(0x0d);//13
WriteData(0x22);//14
WriteData(0xC4);//15
WriteData(0x0C);//16
WriteData(0x77);//17
WriteData(0x22);//18
WriteData(0x44);//19
WriteData(0xAA);//20
WriteData(0x55);//21
WriteData(0x04);//22
```

```
WriteData(0x04);//23
WriteData(0x12);//24
WriteData(0xA0);//25
WriteData(0x08);//26


WriteAddr(0x02);
WriteData(0x00);
WriteData(0xD5);
WriteData(0x00);
WriteData(0x50);//0
WriteData(0x60);//1
WriteData(0x8a);//2
WriteData(0x00);//3
WriteData(0x35);//4
WriteData(0x04);//5
WriteData(0x71);//6
WriteData(0x02);//7
WriteData(0x03);//8
WriteData(0x03);//9
WriteData(0x03);//10
WriteData(0x00);//11
WriteData(0x04);//12
WriteData(0x02);//13
WriteData(0x13);//14
WriteData(0x46);//15
WriteData(0x03);//16
WriteData(0x03);//17
WriteData(0x03);//18
WriteData(0x03);//19
WriteData(0x86);//20
WriteData(0x00);//21
WriteData(0x00);//22
WriteData(0x00);//23
WriteData(0x80);//24
WriteData(0x52);//25
WriteData(0x7c);//26
WriteData(0x00);//27
WriteData(0x00);//28
WriteData(0x00);//29
```

```
WriteAddr(0x02);
WriteData(0x00);
WriteData(0xD6);
WriteData(0x00);
WriteData(0x10);//0
WriteData(0x32);//1
WriteData(0x54);//2
WriteData(0x76);//3
WriteData(0x98);//4
WriteData(0xBA);//5
WriteData(0xDC);//6
WriteData(0xFE);//7
WriteData(0x00);//8
WriteData(0x00);//9
WriteData(0x01);//10
WriteData(0x83);//11
WriteData(0x03);//12
WriteData(0x03);//13
WriteData(0x33);//14
WriteData(0x03);//15
WriteData(0x03);//16
WriteData(0x33);//17
WriteData(0x3F);//18
WriteData(0x03);//19
WriteData(0x03);//20
WriteData(0x03);//21
WriteData(0x20);//22
WriteData(0x20);//23
WriteData(0x00);//24
WriteData(0x24);//25
WriteData(0x51);//26
WriteData(0x23);//27
WriteData(0x01);//28
WriteData(0x00);//29


WriteAddr(0x02);
WriteData(0x00);
WriteData(0xD7);//CG
```

```
WriteData(0x00);
WriteData(0x18);//0
WriteData(0x1A);//1
WriteData(0x1B);//2
WriteData(0x1F);//3
WriteData(0x0A);//4
WriteData(0x08);//5
WriteData(0x0E);//6
WriteData(0x0C);//7
WriteData(0x00);//8
WriteData(0x1F);//9
WriteData(0x1d);//10
WriteData(0x1F);//11
WriteData(0x50);//12
WriteData(0x60);//13
WriteData(0x04);//14
WriteData(0x00);//15
WriteData(0x1f);//16
WriteData(0x1F);//17
WriteData(0x1F);//18


WriteAddr(0x02);
WriteData(0x00);
WriteData(0xD8);//CG
WriteData(0x00);
WriteData(0x18);//0
WriteData(0x1A);//1
WriteData(0x1B);//2
WriteData(0x1f);//3
WriteData(0x0B);//4
WriteData(0x09);//5
WriteData(0x0F);//6
WriteData(0x0D);//7
WriteData(0x01);//8
WriteData(0x1F);//9
WriteData(0x1d);//10
WriteData(0x1F);//11


WriteAddr(0x02);
```

```
WriteData(0x00);
WriteData(0xD9);
WriteData(0x00);
WriteData(0x0F);//1
WriteData(0x09);//2
WriteData(0x0B);//3
WriteData(0x1F);//4
WriteData(0x18);//5
WriteData(0x19);//6
WriteData(0x1F);//7
WriteData(0x01);//8
WriteData(0x1E);//9
WriteData(0x1d);//10
WriteData(0x1F);//11


WriteAddr(0x02);
WriteData(0x00);
WriteData(0xDD);
WriteData(0x00);
WriteData(0x0E);//1
WriteData(0x08);//2
WriteData(0x0A);//3
WriteData(0x1F);//4
WriteData(0x18);//5
WriteData(0x19);//6
WriteData(0x1F);//7
WriteData(0x00);//8
WriteData(0x1E);//9
WriteData(0x1A);//10
WriteData(0x1F);//11


WriteAddr(0x02);
WriteData(0x00);
WriteData(0xDF);
WriteData(0x00);
WriteData(0x44);//0
WriteData(0x33);//1
WriteData(0x4B);//2
WriteData(0x69);//3
```

```
WriteData(0x00);//4
WriteData(0x0A);//5
WriteData(0x02);//6
WriteData(0x90);//7

//////////////////2.2
WriteAddr(0x02);
WriteData(0x00);
WriteData(0xE0);
WriteData(0x00);
WriteData(0x35);//0
WriteData(0x08);//1
WriteData(0x19);//2
WriteData(0x1c);//3
WriteData(0x0c);//4
WriteData(0x09);//5
WriteData(0x13);//6
WriteData(0x2a);//7
WriteData(0x54);//8
WriteData(0x21);//9
WriteData(0x0b);//10
WriteData(0x15);//11
WriteData(0x13);//12
WriteData(0x25);//13
WriteData(0x27);//14
WriteData(0x08);//15
WriteData(0x00);//16



WriteAddr(0x02);
WriteData(0x00);
WriteData(0xE1);
WriteData(0x00);
WriteData(0x3e);//0
WriteData(0x08);//1
WriteData(0x19);//2
WriteData(0x1c);//3
WriteData(0x0c);//4
WriteData(0x08);//5
WriteData(0x13);//6
```

```
WriteData(0x2a);//7
WriteData(0x54);//8
WriteData(0x21);//9
WriteData(0x0b);//10
WriteData(0x14);//11
WriteData(0x13);//12
WriteData(0x26);//13
WriteData(0x27);//14
WriteData(0x08);//15
WriteData(0x0f);//16


/////gamma 2.0/////
WriteAddr(0x02);
WriteData(0x00);
WriteData(0xE2);
WriteData(0x00);
WriteData(0x19);//0
WriteData(0x20);//1
WriteData(0x0A);//2
WriteData(0x11);//3
WriteData(0x09);//4
WriteData(0x06);//5
WriteData(0x11);//6
WriteData(0x25);//7
WriteData(0xD4);//8
WriteData(0x22);//9
WriteData(0x0B);//10
WriteData(0x13);//11
WriteData(0x12);//12
WriteData(0x2D);//13
WriteData(0x32);//14
WriteData(0x2f);//15
WriteData(0x03);//16


WriteAddr(0x02);
WriteData(0x00);
WriteData(0xE3);
WriteData(0x00);
WriteData(0x38);//0
```

```
WriteData(0x20);//1
WriteData(0x0A);//2
WriteData(0x11);//3
WriteData(0x09);//4
WriteData(0x06);//5
WriteData(0x11);//6
WriteData(0x25);//7
WriteData(0xC4);//8
WriteData(0x21);//9
WriteData(0x0A);//10
WriteData(0x12);//11
WriteData(0x11);//12
WriteData(0x2C);//13
WriteData(0x32);//14
WriteData(0x2f);//15
WriteData(0x27);//16


WriteAddr(0x02);
WriteData(0x00);
WriteData(0xE4);
WriteData(0x00);
WriteData(0x19);//0
WriteData(0x20);//1
WriteData(0x0D);//2
WriteData(0x14);//3
WriteData(0x0D);//4
WriteData(0x08);//5
WriteData(0x12);//6
WriteData(0x2A);//7
WriteData(0xD4);//8
WriteData(0x26);//9
WriteData(0x0E);//10
WriteData(0x15);//11
WriteData(0x13);//12
WriteData(0x34);//13
WriteData(0x39);//14
WriteData(0x2f);//15
WriteData(0x03);//16
```

```
WriteAddr(0x02);
WriteData(0x00);
WriteData(0xE5);
WriteData(0x00);
WriteData(0x38);//0
WriteData(0x20);//1
WriteData(0x0D);//2
WriteData(0x13);//3
WriteData(0x0D);//4
WriteData(0x07);//5
WriteData(0x12);//6
WriteData(0x29);//7
WriteData(0xC4);//8
WriteData(0x25);//9
WriteData(0x0D);//10
WriteData(0x15);//11
WriteData(0x12);//12
WriteData(0x33);//13
WriteData(0x39);//14
WriteData(0x2f);//15
WriteData(0x27);//16


WriteAddr(0x02);
WriteData(0x00);
WriteData(0xBB);
WriteData(0x00);
WriteData(0x00);//0
WriteData(0x00);//1
WriteData(0x00);//2
WriteData(0x00);//3
WriteData(0x00);//4
WriteData(0x00);//5
WriteData(0x00);//6
WriteData(0x00);//7


WriteAddr(0x02);
WriteData(0x00);
WriteData(0x11);
WriteData(0x00);
```

```
Delay(200);

WriteAddr(0x02);
WriteData(0x00);
WriteData(0x29);
WriteData(0x00);
Delay(100);

WriteAddr(0x02);
WriteData(0xff);
WriteData(0xff);
WriteData(0xff);
Delay(100);
```

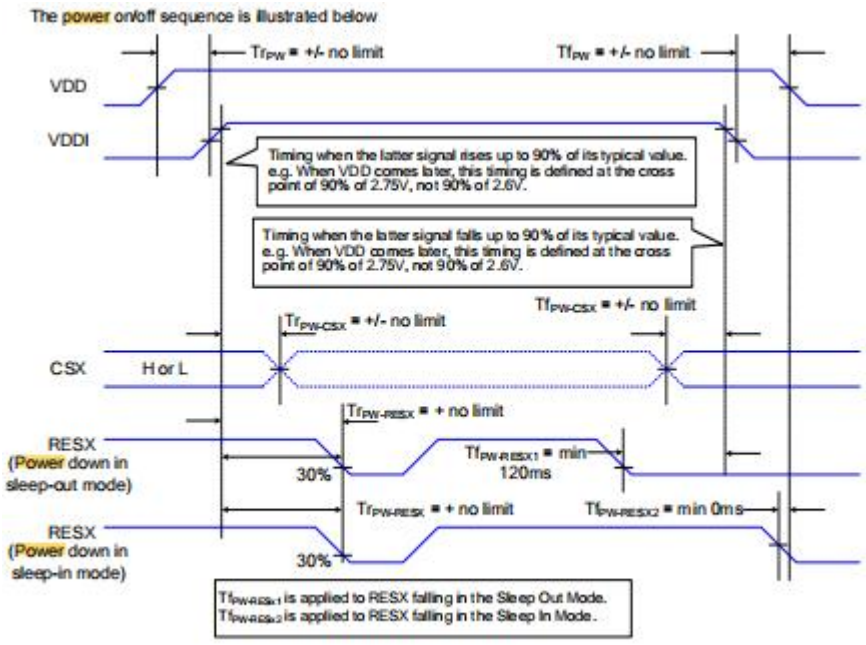
9 Optical Specifications 光学规格

9.1 Optical Specifications 光学规格

Ta=25ºC, VDD=2.8V, TN LC+ Polarizer

	Item 项目		Symbol 标志	Condition 条件	Specification 规范			Unit 单位
					Min. 最小	Typ. 中间	Max. 最大	
Backlight On (Transmissive Mode)	Luminance on surface(I_f =20mA) 表面亮度		*Lv*	Normally viewing angle $\theta_X=\theta_Y$ =0º		350	-	cd/m²
	Contrast ratio 对比度		*CR*		900	1200	-	-
	Response time 响应时间		*TR*		-	10	15	ms
			TF	-	-	20	20	
	Chromaticity Transmissive 色度	Red 红	*XR*	-	-	-	-	-
			YR		-	-	-	-
		Green 绿	*XG*		-	-	-	-
			YG		-	-	-	-
		Blue 蓝	*XB*		-	-	-	-
			YB		-	-	-	-
		White 白	*XW*		-	0.308		-
			YW		-	0.337	-	-
	Viewing Angle 视角	Horizontal	θX+	Center CR≥10	75	80	-	Deg.
			θX-		75	80	-	
		Vertical	θY+		75	80	-	
			θY-		75	80	-	
	NTSC Ratio(Gamut)		-	-	65	70	-	%

9.2 The power on/off sequence is illustrated below 电源启动/关闭顺序



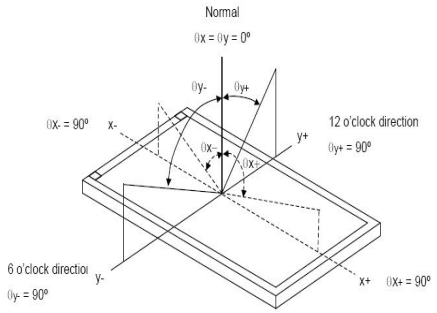
9.3 Definition of Contrast Ratio 对比度的定义

Contrast is measured perpendicular to display surface in reflective and transmissive mode. The measurement condition is:

Measuring Equipment 测量设备	**BM-7 or EQUI**
Measuring Point Diameter 测点直径	3mm//1mm
Measuring Point Location 测点位置	Active Area centre point
Test pattern 测试模式	A: All Pixels white
	B: All Pixel black
Contrast setting	Maximum

Definitions: CR (Contrast) = Luminance of White Pixel / Luminance of Black Pixel

9.4 Definition of Viewing Angles 视角的定义



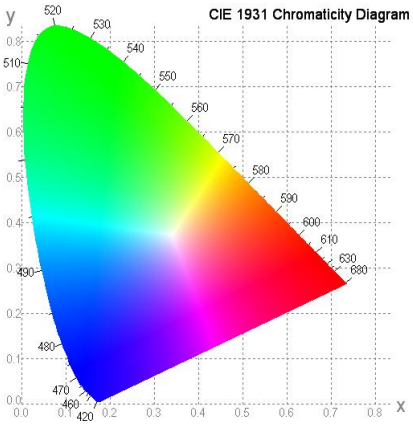
Measuring machine: LCD-5100 or EQUI

9.5 Definition of Color Appearance 色域的定义

R,G,B and W are defined by (x, y) on the IE chromaticity diagram

NTSC=area of RGB triangle/area of NTSC triangleX100%

Measuring picture: Red, Green, Blue and White (Measuring machine: BM-7)



9.6 Definition of Surface Luminance, Uniformity and Transmittance

表面亮度、均匀性和透光率的定义

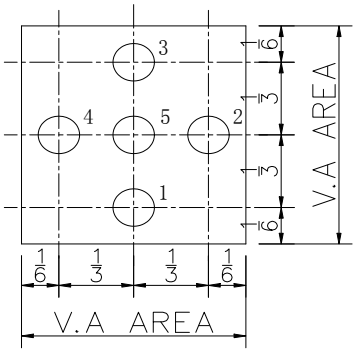
Using the transmissive mode measurement approach, measure the white screen luminance of the display panel and backlight.

9.6.1 Surface Luminance: LV = average (LP1:LP5)

9.6.2 Uniformity = Minimal (LP1:LP5) / Maximal (LP1:LP5) * 100%

9.6.3 Transmittance = LV on LCD / LV on Backlight * 100%

Note :Measuring machine:BM-7



10 Quality Assurance 质量标准

10.1 Purpose 目的

This standard for Quality Assurance assures the quality of LCD module products supplied to customer by Tailorpixels .

10.2 Agreement Items 协议项目

Tailorpixels and customer shall negotiate if the following situation occurs:

10.2.1 Discrepancies between Tailorpixels ’s QA standards and customer’s QA standards.

10.2.2 Additional requirement to be added in product specification.

10.2.3 Any other special problem.

10.3 Standard of the Product Visual Inspection 产品外观检验标准

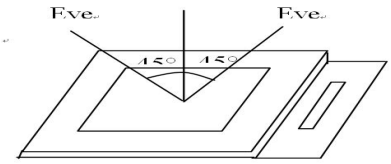
10.3.1 Appearance inspection:

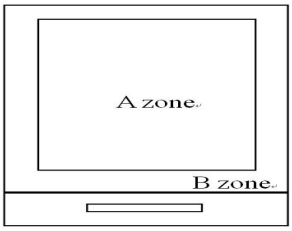
10.3.1.1 The inspection must be under illumination about 1000 – 1500 lx, and the distance of view must be at 30cm ± 2cm.

10.3.1.2 The viewing angle should be 45° from the vertical line without reflection light or

follows customer's viewing angle specifications.

10.3.1.3 Definition of area: A Zone: Active Area, B Zone: Viewing Area.





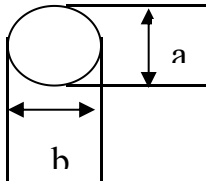
10.3.2 Basic principle:A set of sample to indicate the limit of acceptable quality level must be discussed by both Tailorpixels and customer when there is any dispute happened.

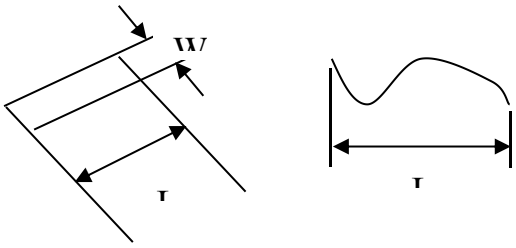
10.4 Inspection Specification 检验标准

Sampling plan according to GB/T2828.1-2012/ISO 2859-1：1999 and ANSI/ASQC Z1.4-1993,normal level 2 and based on:

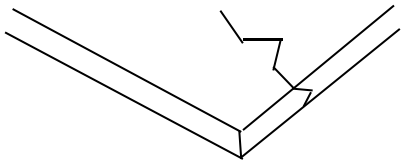
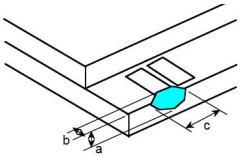
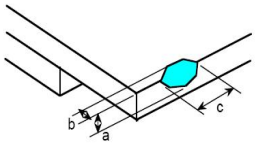
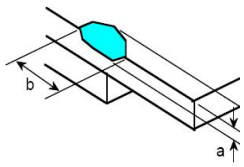
Major defect: AQL 0.4

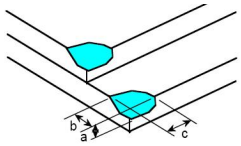
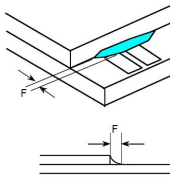
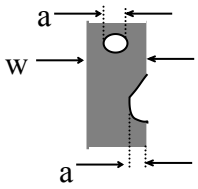
Minor defect: AQL 1.0

<table>
<tr><th>No.</th><th>Item 项目</th><th>Criteria (Unit: mm) 标准</th></tr>
<tr><td>01</td><td>Black / White spot
Foreign material
(Round type)
Pinholes Stain
Particles inside cell.
(Minor defect) 黑/白斑/异物
(圆类型)细胞内的针孔染色颗粒。(小瑕疵)</td><td> 

<table>
<tr><th>Area / Size</th><th>Acc. Qty</th></tr>
<tr><td>φ≤0.10</td><td>Ignore</td></tr>
<tr><td>0.10<φ≤0.2</td><td>2</td></tr>
<tr><td>0.2<φ</td><td>0</td></tr>
<tr><td>Total</td><td>N≦3
NO include
φ≤ 0.10</td></tr>
</table>
φ= (a + b) /2
Distance between 2 defects should more than10mm apart.</td></tr>
<tr><td>02</td><td>Black and White line
Scratch
Foreign material
(Line type)
(Minor defect) 黑白线刮伤异物(类型)行(小瑕疵)</td><td> 

<table>
<tr><th>Length</th><th>Width</th><th>Acc. Qty</th></tr>
<tr><td>/</td><td>W ≦ 0.03</td><td>Ignore</td></tr>
<tr><td>L ≦ 3</td><td>0.05 ＜ W ≦ 0.08</td><td>2</td></tr>
<tr><td>/</td><td>0.08 ＜ W</td><td>0</td></tr>
<tr><td colspan="2">Total</td><td>N≦2</td></tr>
</table>
Distance between 2 defects should more than 10mm apart.
Scratches not viewable through the back of the display are acceptable.</td></tr>
</table>

<table>
<tr><th>No.</th><th>Item 项目</th><th>Criteria (Unit: mm) 标准</th></tr>
<tr><td>03</td><td>Glass Crack
(Minor defect) 玻璃裂纹(小瑕疵)</td><td> 
LCD with extensible crack line is unacceptable(When press the cracked LCD area, the line will expand, we define it is extensible crack line)</td></tr>
<tr><td>04</td><td>Glass Chipping Pad Area: (Minor defect) 玻璃碎片面积:(轻微缺陷)
  </td><td><table><tr><td>Length and Width</td><td>Acc. Qty</td></tr><tr><td>c ＜ 5.0, b< 0.4</td><td>Ignore</td></tr></table></td></tr>
<tr><td>05</td><td>Glass Chipping Rear of PadArea:(Minordefect) 玻璃切屑垫区后方:(小瑕疵)
  </td><td><table><tr><td>Length and Width</td><td>Acc. Qty</td></tr><tr><td>c > 3.0, b< 1.0</td><td>1</td></tr><tr><td>c< 3.0, b< 1.0</td><td>2</td></tr><tr><td>c< 3.0, b< 0.5</td><td>4</td></tr><tr><td colspan="2">a<Glass Thickness</td></tr></table></td></tr>
<tr><td>06</td><td>Glass Chipping Except Pad Area: (Minor defect) 除垫区外的玻璃切屑:(小瑕疵)
  </td><td><table><tr><td>Length and Width</td><td>Acc. Qty</td></tr><tr><td>c ≤0.6, b< 5.0</td><td>Ignore</td></tr><tr><td colspan="2">aGlass Thickness</td></tr></table></td></tr>
</table>

<table>
<tr><th>No.</th><th>Item 项目</th><th>Criteria (Unit: mm) 标准</th></tr>
<tr><td>07</td><td>Glass Corner Chipping: (Minor defect) 玻璃切角:(小瑕疵)
  </td><td><table><tr><td>Length and Width</td><td>Acc. Qty</td></tr><tr><td>c < 2.0, b< 1.5</td><td>Ignore</td></tr><tr><td>c < 1.5, b< 2</td><td>Ignore</td></tr><tr><td colspan="2">a<Glass Thickness</td></tr></table></td></tr>
<tr><td>08</td><td>Glass Burr: (Minor defect) 玻璃磨:(小瑕疵)
  </td><td>Glass burr don’t affect assemble and module dimension.
<table><tr><td>Length</td><td>Acc. Qty</td></tr><tr><td>F < 0.5</td><td>Ignore</td></tr></table></td></tr>
<tr><td>09</td><td>FPC Defect: (Minor defect) FPC 缺陷:(小瑕疵)
  </td><td>9.1 Dent, pinhole width a<w/3.
(w: circuitry width.)
9.2 Open circuit is unacceptable.
9.3 No oxidation, contamination and distortion.</td></tr>
<tr><td>10</td><td>Screen deformation 屏幕上的变形
  </td><td>Test for insertion of plug gauge at highest warping point：
(3.1-6.0inches)
H≦0.3MM
The client has special requirements,according to drawing</td></tr>
<tr><td>11</td><td>Bubble on Polarizer (Minor defect) 偏光片上的气泡(小瑕疵)</td><td><table><tr><td>Diameter</td><td>Acc. Qty</td></tr><tr><td>φ≤0.15</td><td>Ignore</td></tr><tr><td>0.15 <φ≤0.25</td><td>2</td></tr><tr><td>0.25 <φ≤0.3</td><td>1</td></tr><tr><td>0.3 < φ</td><td>0</td></tr></table></td></tr>
<tr><td>12</td><td>Dent on Polarizer (Minor defect) 偏光片上的凹痕(小瑕疵)</td><td><table><tr><td>Diameter</td><td>Acc. Qty</td></tr><tr><td>φ≤0.15</td><td>Ignore</td></tr><tr><td>0.15 <φ≤0.25</td><td>2</td></tr><tr><td>0.2 5<φ≤0.30</td><td>1</td></tr><tr><td>0.3< φ</td><td>0</td></tr></table></td></tr>
</table>

No.	Item 项目	Criteria (Unit: mm) 标准
13	Bezel 边框	13.1 No rust, distortion on the Bezel.
14	Touch Panel 触控面板	D: Diameter W: width L: length 14.1 Spot: D≤0.20 is acceptable 0.20<D≤0.3, acceptable QTY, 3 D>0.3 is unacceptable 14.2 Dent（dot): D≤0.20 is acceptable 0.20<D≤0.3, acceptable QTY, 3 D>0.30 is unacceptable 2dots are acceptable and the distance between defects should more than 10 mm. Dent（line） According to the limit sample 14.3 Scratch: W≤0.03, L≤10 is acceptable, 0.03<W≤0.10, L≤10 ,acceptable QTY, 3 W>0.10 is unacceptable. Distance between 2 defects should more than 10 mm.
15	PCB	15.1 No distortion or contamination on PCB terminals. 15.2 All components on PCB must same as documented on the BOM/component layout. 15.3 Follow IPC-A-600F.
16	Soldering 焊接	Follow IPC-A-610C standard
17	Electrical Defect (Major defect) 电气缺陷(主要缺陷)	The below defects must be rejected. 17.1 Missing vertical / horizontal segment, 17.2 Abnormal Display. 17.3 No function or no display. 17.4 Current exceeds product specifications. 17.5 LCD viewing angle defect. 17.6 No Backlight. 17.7 Dark Backlight. 17.8 Touch Panel no function. 17.9 Dark Dot –one Allowed. 17.10 Bright Dot – one Allowed. Remark: 1. A pixel defect is acceptable if one color is none functional and causes a bright dot. The display may have one case where one color is out and cause a dark dot. 2. Bright dot caused by scratch and foreign object accords to item1.
18	Light leak 漏光	Yellow light OK; White light,According to the limit sample

Remark: Visual and cosmetic defects are rejectable only if these fall within the LCD viewing area.

10.5 Classification of Defects 缺陷的分类

Visual defects (Except no / wrong label) are treated as minor defect and electrical defect is major.

10.6 Identification/marking criteria 识别/评分标准

Any unit with illegible / wrong /double or no marking/ label shall be rejected.

10.7 Packing 包装

10.7.1 There should be no damage of the outside carton box, each packaging box should has label in the correct location per packing drawing requirement.

10.7.2 All direct package materials shall offer ESD protection.

11 Reliability Specification 可靠性规范

Item 项目	Condition 条件	Cycle Time 周期时间	Quantity 数量	Remark 备注
Constant Temp. and Constant Humidity Operation Test 恒温恒湿运行试验	+40 ± 3ºC,90 ± 3%RH	96hrs	--	*1
High Temp. Operation Test 高温操作试验	+70 ± 3ºC	96hrs	--	
Low Temp. Operation Test 低温操作试验	-20 ± 3ºC	96hrs	--	
Thermal Shock Test 热冲击试验	-20 ± 3ºC (30min) +70 ± 3ºC (30min)	10cycles	--	
ESD Test(end product) ESD 测试(最终产品)	150pF, 330Ω, ±2KV,Contact 150pF, 330Ω, ±6KV, Air	10times	--	*2, *3
Vibration Test(for packaging) 振动测试(包装)	Frequency: 10Hz to 55Hz to10Hz,Swing:1.5mm,time：X,Y,Z each 2H.	6hrs	One inner carton	*4

Note 1. For humidity test, DI water should be used.

Inspection Standard: Inspect after 1-2hrs storage at room temperature, the sample shall be free from the following defects:

- Air bubble in the LCD
- Seal Leakage
- Non-display
- Missing Segment
- Glass Crack
- IDD is greater than twice initial value.
- Others as per QA Inspection Criteria

Note 2. No defect is allowed after testing

The End Product ESD value is only indicative and depends on customer ESD protection design for the whole system.

Note 3. ESD should be applied to LCD glass panel, not other areas (such as on IC and so on)

IDD should be within twice initial value.

In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part.

Note 4. Only upon request.

12 Precautions and Warranty 注意事项和保证

12.1 Safety 安全

12.1.1 The liquid crystal in the LCD is poisonous. Do not put it in your mouth. If the liquid crystal touches your skin or clothes, wash it off immediately using soap and water.

12.1.2 Since the liquid crystal cells are made of glass, do not apply strong impact on them. Handle with care.

12.2 Handling 处理

12.2.1 Reverse and use within ratings in order to keep performance and prevent damage.

12.2.2 Do not wipe the polarizer with dry cloth, as it might cause scratch. If the surface of the LCD needs to be cleaned, wipe it swiftly with cotton or other soft cloth soaked with petroleum IPA, do not use other chemicals.

12.3 Operation 操作

12.3.1 Do not drive LCD with DC voltage

12.3.2 Response time will increase below lower temperature

12.3.3 Display may change color with different temperature

12.3.4 Mechanical disturbance during operation, such as pressing on the display area, may `cause the segments to appear “fractured”.

12.4 Static Electricity 静电

12.4.1 CMOS LSIs are equipped in this unit, so care must be taken to avoid the electro-static charge, by ground human body, etc.

12.4.2 The normal static prevention measures should be observed for work clothes and benches.

12.4.3 The module should be kept into anti-static bags or other containers resistant to static for storage.

12.5 Limited Warranty 有限质量保证

12.5.1 Unless otherwise agreed between Tailorpixels and customer, Tailorpixels will replace or repair any of its LCD and LCM which Tailorpixels found to be defective electrically and visually when inspected in accordance with Tailorpixels Quality Standards , for a period of one year from date of shipment.

12.5.2 The warranty liability of Tailorpixels is limited to repair and/or replacement. Tailorpixels will not be responsible for any consequential loss.

12.5.3 If possible, we suggest you use up all modules in six months. If the module storage time over twelve months, we suggest that recheck it before the module be used.

13 Packaging 包装

TBD

14 Prior Consult Matter 免责声明

1. For Tailorpixels standard products, we keep the right to change material, process for improving the product property without prior notice to our customer.

2. For OEM products, if any changes are needed which may affect the product property, we will consult with our customer in advance.

3. If you have special requirement about reliability condition, please let us know before you start the test on our samples.

Reference 参考

Item 项目	Description 描述	Revision 修订
AXS12531B	IC Data sheet	V1.0
Panel 3.48 寸 172X640	LCM assembly drawing	V1