华夏彩光电（深圳）有限公司

Huaxia RGB Display（Shen Zhen）Co.,Ltd

规格书

第 1 页

Product Specification

客户名称 Customer	
客户项目号 Part NO	
产品型号 Part NO	H0189S002T002 V1
产品内容 Product type	Mode:Transmissive type .Normally black. TFTLCD Module LCD Module: 1.89" 320RGB*386Dot QSPI
客户确认签章 Signature by Customer:	

PREPARED BY	CHECKED BY	APPROVED BY

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	2023/06/20	首 次	24	

Table of Contents 目录

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 1.89" contains 320RGB x 386 dots and can display up to 262K colors.
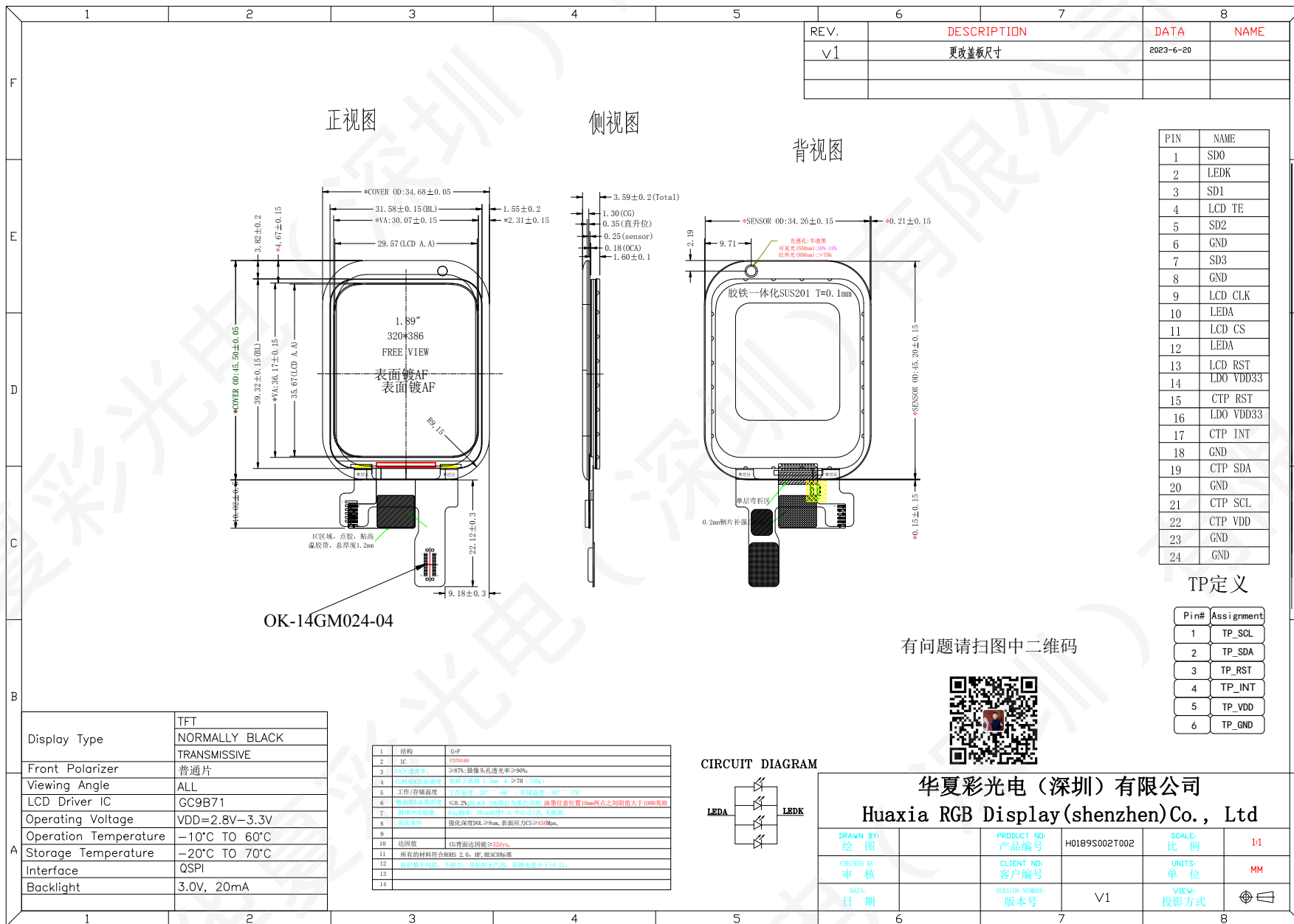
该显示模块是一种采用非晶硅 TFT 作为开关器件的透射型彩色有源矩阵 TFT(薄膜晶体管)液晶显示器。该模块由 TFT 液晶显示模块、驱动电路和背光单元组成。1.89 英寸的分辨率包含 320RGB x 386 点，可显示高达 262K 的颜色。

2 Module Parameter 模组参数

Features	Details	Unit
Display Size(Diagonal) 显示尺寸(对角线)	1.89	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	320RGB x 386	-
Active Area 显示区	29.57(H)×35.67(V)	mm
Module Outline 模组外形	31.58(H) ×39.32(V)×1.6(T)	mm
Display Colors 显示颜色	262K	-
Interface 接口	QSPI	-
Driver IC 驱动 IC	GC9B71	-
TP Viewing Area TP 视窗	30.07X36.17	mm
TP Outline(assembly) TP 外形	34.68(H) ×45.5(V)×1.3(T)	mm
Luminance on surface 亮度	400	cd/m²
View Direction 视角方向	All	Best image
Contrast ratio 对比度	800:1	-
Color gamut 色域	60%	-
PPI 图像点密集度	274	-
Window effect 视窗效果	无一体黑	-
Cover plate surface effect 盖板表面效果	无 AF/AG	-
Operating Temperature 工作温度	-20～70	ºC
Storage Temperature 储存温度	-30～80	ºC
Weight 重量	TBD	g
连接器	OK-14GM024-04	

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

3 Mechanical Drawings

REV.	DESCRIPTION	DATA	NAME
V1	更改盖板尺寸	2023-6-20	

正视图　　　　　　　侧视图　　　　　　　　　背视图

*COVER OD:34.68±0.05
31.58±0.15(BL)
*VA:30.07±0.15
29.57(LCD A.A)
1.55±0.2
*2.31±0.15
3.82±0.2
*4.67±0.15

3.59±0.2(Total)
1.30(CG)
0.35(直升位)
0.25(sensor)
0.18(OCA)
1.60±0.1

*SENSOR OD:34.26±0.15
*0.21±0.15
2.19
9.71
光感孔:半透黑
可见光(550nm):10%-15%
红外光(880nm):>75%

*COVER OD:45.50±0.05
*VA:36.17±0.15
35.67(LCD A.A)
39.32±0.15(BL)

胶铁一体化SUS201 T=0.1mm

*SENSOR OD:45.20±0.15
*0.15±0.15

1.89″
320*386
FREE VIEW
表面镀AF
表面镀AF

R9.15

22.12±0.3
9.18±0.3

IC区域，点胶，贴高温胶带，总厚度1.2mm

OK-14GM024-04

单层弯折区
0.2mm钢片补强

有问题请扫图中二维码

PIN 定义

PIN	NAME
1	SD0
2	LEDK
3	SD1
4	LCD TE
5	SD2
6	GND
7	SD3
8	GND
9	LCD CLK
10	LEDA
11	LCD CS
12	LEDA
13	LCD RST
14	LDO VDD33
15	CTP RST
16	LDO VDD33
17	CTP INT
18	GND
19	CTP SDA
20	GND
21	CTP SCL
22	CTP VDD
23	GND
24	GND

TP定义

Pin#	Assignment
1	TP_SCL
2	TP_SDA
3	TP_RST
4	TP_INT
5	TP_VDD
6	TP_GND

Display Type	TFT
	NORMALLY BLACK
	TRANSMISSIVE
Front Polarizer	普通片
Viewing Angle	ALL
LCD Driver IC	GC9B71
Operating Voltage	VDD=2.8V-3.3V
Operation Temperature	-10°C TO 60°C
Storage Temperature	-20°C TO 70°C
Interface	QSPI
Backlight	3.0V, 20mA

1	结构	G+F
2	IC	CST826D
3	VA片透光率:	≥87%;摄像头孔透光率≥90%;
4	CG材料及表面硬度	硬盖干玻璃 1.3mm A ≥7H (750g)
5	工作/存储温度	工作温度-20~+60 存储温度-30~+70
6	膜内80%透射率	≤0.2%;BLACK 150CD/m²为黑点白点 油墨位置位置10mm两点之间阻值大于1000亮度
7	铜片补强量	粘贴钢片厚 20mm白PET A 中心点3%外 无延期
8	强化条件	强化深度DOL≥8um,表面应力CS≥450Mpa.
9		
10	达因值	CG背面达因能≥32dyn,
11		所有的材料符合ROHS 2.0, HF, REACH标准
12		保护镀不划伤、不掉灰、屏幕面无气泡、屏幕电量身于10-11:
13		
14		

CIRCUIT DIAGRAM

LEDA　　　LEDK

华夏彩光电（深圳）有限公司
Huaxia RGB Display(shenzhen)Co., Ltd

DRAWN BY: 绘图	PRODUCT NO 产品编号	H0189S002T002	SCALE: 比例	1:1
CHECKED BY: 审核	CLIENT NO 客户编号		UNITS: 单位	MM
DATA: 日期	VERSION NUMBER 版本号	V1	VIEW 投影方式	

4   Module Interface 模组接口定义

NO	SYMBOL	FUNCTION
1	SD0	Q/O SPI Data pin
2	LEDK	LED Cathode
3	SD1	Q/O SPI Data pin..
4	TE	Tearing effect output. If not used, leave this pin open
5	SD2	Q/O SPI Data pin.
6	GND	Power Ground
7	SD3	Q/O SPI Data pin.
8	GND	Power Ground
9	CLK	the serial input/output clock in serial interface mode
10	LEDA	LED Anode
11	CS	CS Chip selection pin; Low enable, High disable
12	LEDA	LED Anode
13	RST	This signal will reset the device and it must be applied to properly initialize the chip.Signal is active low
14	VDD3.3	Power Supply for Analog, VCC=2.4V~3.3V.
15	CTP RST	Touch panel rese.If not used, please open it.
16	VDD3.3	Power Supply for Analog, VCC=2.4V~3.3V.
17	CTP INT	Touch panel interrupt output.If not used, please open it.
18	GND	Power Ground
19	CTP SDA	Touch panel I2C data.If not used, please open it
20	GND	Power Ground
21	CTP SCL	Touch panel I2C clock..If not used, please open it.
22	CTP VDD	Touch panel Power Supply for Analog.If not used, please open it.
23	GND	Power Ground
24	GND	Power Ground

5   Application Circuit 应用电路

5.1 Backlight recommended circuit 背光电路参考

Motherboard driver backlight is need constant current circuit, if the rated voltage screen after light brightness difference.Current and power consumption of the machine are inconsistent, so recommend a backlight driving circuit is best rated current.It is recommended to use IC (AW9364). The reference circuit is as follows：

AW9364
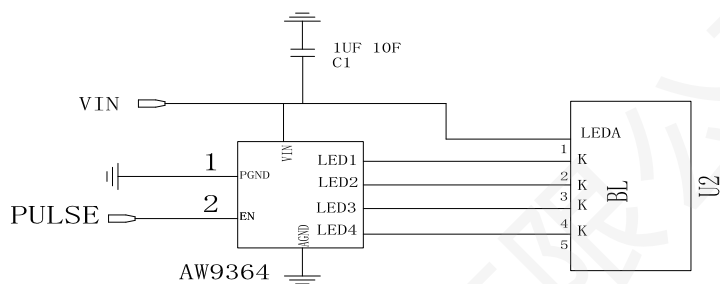
5.2Backlight recommended circuit 背光电路参数推荐

Motherboard driver backlight is need constant current circuit:

CIRCUIT DIAGRAM

LEDA   LEDK

4 PCS WHITE LED;IF =80mA,VF=3.0V
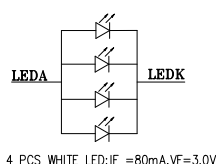
4 灯并联

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	VDD	-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	+70	ºC
Operating temperature 工作温度		T_{op}	-20	+60	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	VDD	2.4	2.8	3.3	V
	Analog	VCI	2.4	2.8	3.3	V
	IO	IOVDD	1.65	1.8/2.8	3.3	V
Logic Low input voltage 输入电压低		V_{IL}	-0.3IOVDD	-	0.3IOVDD	V
Logic High input voltage 输入电压高		V_{IH}	0.7IOVDD	-	IOVDD	V
Logic Low output voltage 输出电压低		V_{OL}	-	-	0.2IOVDD	V
Logic High output voltage 输出电压高		V_{OH}	0.8IOVDD	-	-	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

```
SPI_CS=0;
   SPI_WriteComm(0xfe);//
internal reg enable
      SPI_CS=1;

      SPI_CS=0;
   SPI_WriteComm(0xef);//
internal reg enable
      SPI_CS=1;


SPI_CS=0;
SPI_WriteComm(0x80);
SPI_WriteData(0x11);
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0x81);
SPI_WriteData(0x70);//LCD_CS
_SET;//
SPI_CS=1;

SPI_CS=0;
```

```
SPI_WriteComm(0x82);
SPI_WriteData(0x09);//LCD_CS
_SET;
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0x83);
SPI_WriteData(0x03);
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0x84);
SPI_WriteData(0x62);//LCD_CS
_SET;//
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0x89);
SPI_WriteData(0x18);
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0x8A);
SPI_WriteData(0x40);
```

```
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0x8B);
SPI_WriteData(0x0A);
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0x3a);
SPI_WriteData(0x05);
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0x36);
SPI_WriteData(0x40);
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0xEC);
SPI_WriteData(0x07);
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0x74);
SPI_WriteData(0x01);
SPI_WriteData(0x80);
SPI_WriteData(0x00);
SPI_WriteData(0x00);
SPI_WriteData(0x00);
SPI_WriteData(0x00);
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0x98);
SPI_WriteData(0x3E);
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0x99);
SPI_WriteData(0x3E);

SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0xA1);
SPI_WriteData(0x01);
SPI_WriteData(0x04);
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0xA2);
SPI_WriteData(0x01);
SPI_WriteData(0x04);
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0xCB);
SPI_WriteData(0x02);
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0x7C);
SPI_WriteData(0xB6);
SPI_WriteData(0x24);
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0xAC);
SPI_WriteData(0x74);
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0xF6);
SPI_WriteData(0x80);
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0xB5);
SPI_WriteData(0x09);
SPI_WriteData(0x09);
SPI_CS=1;
```

```
SPI_CS=0;
SPI_WriteComm(0xEB);
SPI_WriteData(0x01);
SPI_WriteData(0x81);//81
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0x60);
SPI_WriteData(0x38);
SPI_WriteData(0x06);//0c
SPI_WriteData(0x13);
SPI_WriteData(0x56);
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0x63);
SPI_WriteData(0x38);
SPI_WriteData(0x08); //e
SPI_WriteData(0x13);
SPI_WriteData(0x56);
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0x61);
SPI_WriteData(0x3B);
SPI_WriteData(0x1b);
SPI_WriteData(0x58);
SPI_WriteData(0x38);
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0x62);
SPI_WriteData(0x3B);
SPI_WriteData(0x1b);
SPI_WriteData(0x58);
SPI_WriteData(0x38);
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0x64);
SPI_WriteData(0x38);
SPI_WriteData(0x0a);
SPI_WriteData(0x73);
SPI_WriteData(0x16);
SPI_WriteData(0x13);
SPI_WriteData(0x56);
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0x66);
SPI_WriteData(0x38);
SPI_WriteData(0x0b);
SPI_WriteData(0x73);
SPI_WriteData(0x17);
SPI_WriteData(0x13);
SPI_WriteData(0x56);
SPI_CS=1;


SPI_CS=0;
SPI_WriteComm(0x68);
SPI_WriteData(0x00);
SPI_WriteData(0x0B);
SPI_WriteData(0x22);
SPI_WriteData(0x0B);
SPI_WriteData(0x22);
SPI_WriteData(0x1C);
SPI_WriteData(0x1C);
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0x69);
SPI_WriteData(0x00);
SPI_WriteData(0x0B);
SPI_WriteData(0x26);
SPI_WriteData(0x0B);
SPI_WriteData(0x26);
SPI_WriteData(0x1C);
```

```
SPI_WriteData(0x1C);
SPI_CS=1;




SPI_CS=0;
SPI_WriteComm(0x6A);
SPI_WriteData(0x15);
SPI_WriteData(0x00);
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0x6E);
SPI_WriteData(0x08);
SPI_WriteData(0x02);
SPI_WriteData(0x1a);
SPI_WriteData(0x00);
SPI_WriteData(0x12);
SPI_WriteData(0x12);
SPI_WriteData(0x11);
SPI_WriteData(0x11);
SPI_WriteData(0x14);
SPI_WriteData(0x14);
SPI_WriteData(0x13);
SPI_WriteData(0x13);
SPI_WriteData(0x04);
SPI_WriteData(0x19);
SPI_WriteData(0x1e);
SPI_WriteData(0x1d);
SPI_WriteData(0x1d);
SPI_WriteData(0x1e);
SPI_WriteData(0x19);
SPI_WriteData(0x04);
SPI_WriteData(0x0b);
SPI_WriteData(0x0b);
SPI_WriteData(0x0c);
SPI_WriteData(0x0c);

SPI_WriteData(0x09);
SPI_WriteData(0x09);
SPI_WriteData(0x0a);
SPI_WriteData(0x0a);
SPI_WriteData(0x00);
SPI_WriteData(0x1a);
SPI_WriteData(0x01);
SPI_WriteData(0x07);
SPI_CS=1;


SPI_CS=0;
SPI_WriteComm(0x6C);
SPI_WriteData(0xCC);
SPI_WriteData(0x0C);
SPI_WriteData(0xCC);
SPI_WriteData(0x84);
SPI_WriteData(0xCC);
SPI_WriteData(0x04);
SPI_WriteData(0x50);
SPI_CS=1;



SPI_CS=0;
SPI_WriteComm(0x7D);
SPI_WriteData(0x72);
SPI_CS=1;



SPI_CS=0;
SPI_WriteComm(0x70);
SPI_WriteData(0x02);
SPI_WriteData(0x03);
SPI_WriteData(0x09);
SPI_WriteData(0x07);
SPI_WriteData(0x09);
SPI_WriteData(0x03);
SPI_WriteData(0x09);
SPI_WriteData(0x07);
SPI_WriteData(0x09);
SPI_WriteData(0x03);
SPI_CS=1;
```

```
SPI_CS=0;
SPI_WriteComm(0x90);
SPI_WriteData(0x06);
SPI_WriteData(0x06);
SPI_WriteData(0x05);
SPI_WriteData(0x06);
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0x93);
SPI_WriteData(0x45);
SPI_WriteData(0xFF);
SPI_WriteData(0x00);
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0xC3);
SPI_WriteData(0x15);
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0xC4);
SPI_WriteData(0x36);
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0xC9);
SPI_WriteData(0x3d);
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0xF0);
SPI_WriteData(0x47);//gVR1_N[5:0]
SPI_WriteData(0x07);//gVR2_N[5:0]
SPI_WriteData(0x0A);//gVR4_N[4:0]
SPI_WriteData(0x0A);//gVR6_N[4:0]
SPI_WriteData(0x00);//gVR0_N[3:0] gVR13_N[3:0] 7
SPI_WriteData(0x29);//gVR20_N[6:0]
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0xF2);
SPI_WriteData(0x47);//gVR1_P[5:0]
SPI_WriteData(0x07);//gVR2_P[5:0]
SPI_WriteData(0x0a);//gVR4_P[4:0]
SPI_WriteData(0x0A);//gVR6_P[4:0]
SPI_WriteData(0x00);//gVR0_P[3:0] gVR13_P[3:0]
SPI_WriteData(0x29);//gVR20_P[6:0]
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0xF1);
SPI_WriteData(0x42);//gVR43_N[6:0]
SPI_WriteData(0x91);//gVR27_N[2:0] gVR57_N[4:0]
SPI_WriteData(0x10);//gVR36_N[2:0] gVR59_N[4:0]
SPI_WriteData(0x2D);//gVR61_N[5:0]
SPI_WriteData(0x2F);//gVR62_N[5:0]
SPI_WriteData(0x6F);//gVR50_N[3:0] gVR63_N[3:0]
SPI_CS=1;

SPI_CS=0;
SPI_WriteComm(0xF3);
SPI_WriteData(0x42);//gVR43_P
```

```
[6:0]
SPI_WriteData(0x91);//gVR27_P
[2:0] gVR57_P[4:0]
SPI_WriteData(0x10);//gVR36_P
[2:0] gVR59_P[4:0]
SPI_WriteData(0x2D);//gVR61_
P[5:0]
SPI_WriteData(0x2F);//
gVR62_P[5:0]
SPI_WriteData(0x6F);
//gVR50_P[3:0] gVR63_P[3:0]
SPI_CS=1;


SPI_CS=0;
SPI_WriteComm(0xF9);
SPI_WriteData(0x30);
SPI_CS=1;


SPI_CS=0;
SPI_WriteComm(0xBE);
SPI_WriteData(0x11);
SPI_CS=1;


SPI_CS=0;
SPI_WriteComm(0xFB);
SPI_WriteData(0x00);
SPI_WriteData(0x00);
SPI_CS=1;
```

```
/*
//SPI_WriteComm(0xB1);
//SPI_WriteData(0x08);      //
SPI_ 2dat
*/


//gamma end
    SPI_CS=0;
    //SPI_WriteComm(0x35);
    //SPI_WriteData(0x00);
    //59.5Hz
    SPI_WriteComm(0x11);

        Delay(1000);
    SPI_CS=1;


    SPI_CS=0;

    SPI_WriteComm(0x29);
    SPI_CS=1;


    SPI_CS=0;
    SPI_WriteComm(0x2C);

    SPI_CS=1;
```

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	
Luminance on surface(I_f=20mA) 表面亮度		Lv	Normally viewing angle $\theta_X = \theta_Y = 0º$		400	-	cd/m²
Contrast ratio 对比度		CR			800	-	-
Response time 响应时间		TR		-	10	15	ms
		TF		-	20	20	
Chromaticity Transmissive 色度	Red 红	XR	-	0.667	0.669	0.671	-
		YR		0.321	0.323	0.325	-
	Green 绿	XG		0.267	0.269	0.271	-
		YG		0.593	0.595	0.597	-
	Blue 蓝	XB		0.131	0.133	0.135	-
		YB		0.117	0.119	0.121	-
	White 白	XW		0.290	0.292	0.294	-
		YW		0.331	0.333	0.335	-
Viewing Angle 视角	Horizontal	$\theta X+$	Center CR≥10	80	85	-	Deg.
		$\theta X-$		80	85	-	
	Vertical	$\theta Y+$		80	85	-	
		$\theta Y-$		80	85	-	
NTSC Ratio(Gamut)		-	-	55	60	-	%

(Left side vertical label: **Backlight On (Transmissive Mode)**)

9.2   The power on/off sequence is illustrated below 电源启动/关闭顺序
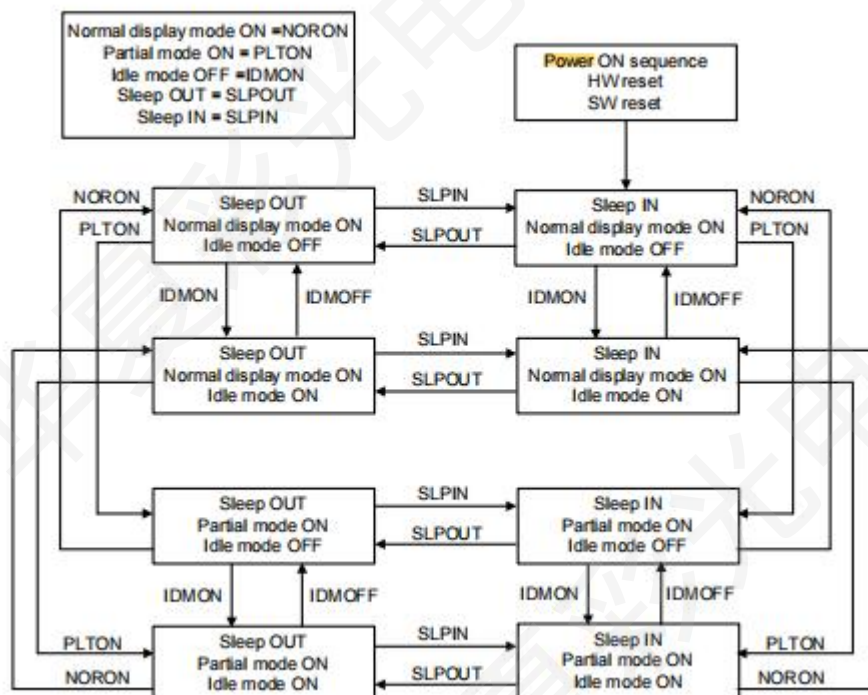
9.3 Definition of Contrast Ratio 对比度的定义

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
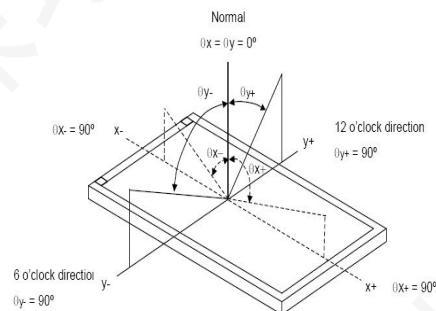
Measuring machine: LCD-5100 or EQUI

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)
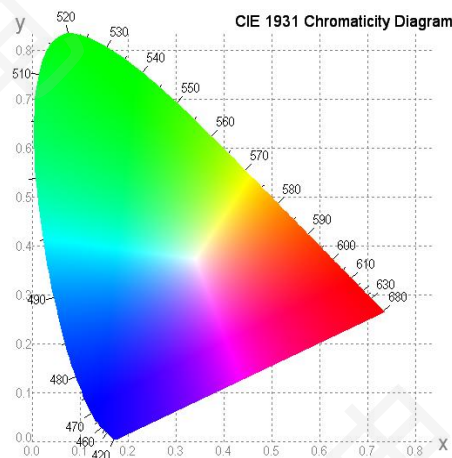
9.6 Definition of Surface Luminance, Uniformity and Transmittance 表面亮度、均匀性和透光率的定义

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
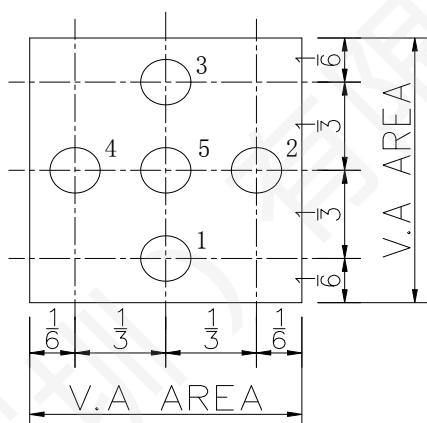
10   Quality Assurance 质量标准

10.1   Purpose 目的

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

10.2   Agreement Items 协议项目

HuaXia RGB Display and customer shall negotiate if the following situation occurs:

10.2.1 Discrepancies between HuaXia RGB Display'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.
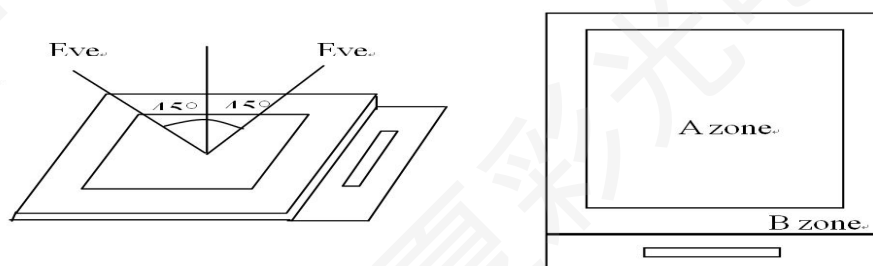
10.3.2 Basic principle:A set of sample to indicate the limit of acceptable quality level must

be

discussed by both HuaXia RGB Display and customer when there is any dispute happened.
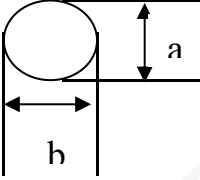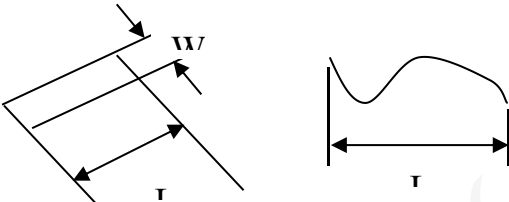
10.4 Inspection Specification 检验标准
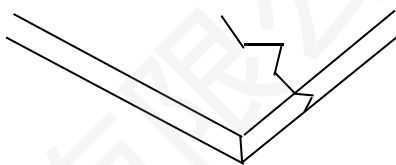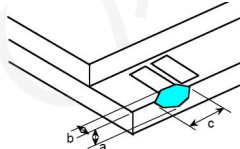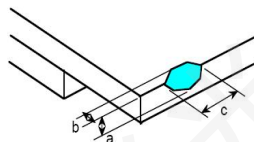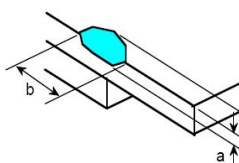
Sampling plan according to GB/T2828.1-2012/ISO 2859-1：1999 and ANSI/ASQC
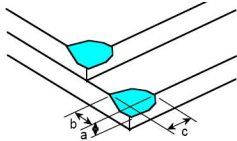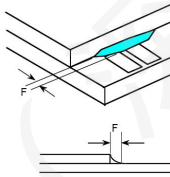
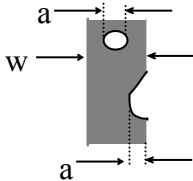Z1.4-1993,normal level 2 and based on:

Major defect: AQL 0.4

Minor defect: AQL 1.0

No.	Item 项目	Criteria (Unit: mm) 标准		
01	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)	$\varphi= (a + b) /2$ Distance between 2 defects should more than10mm apart.	**Size \ Area**	**Acc. Qty**
			$\varphi \leq 0.10$	Ignore
			$0.10 < \varphi \leq 0.2$	2
			$0.2 < \varphi$	0
			Total	$N \leqq 3$ NO include $\varphi \leq 0.10$
02	Black and White line Scratch Foreign material (Line type) (Minor defect) 黑白 线刮伤异物(类型)行 (小瑕疵)		Length / Width / Acc. Qty	

(Item 02 criteria table)

Length	Width	Acc. Qty	
/	W ≦ 0.03	Ignore	
L ≦ 3	0.05 ＜ W ≦ 0.08	2	Distance between 2 defects
/	0.08 ＜ W	0	
Total		N≦2	

should more than 10mm apart.

Scratches not viewable through the back of the display are

acceptable.

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

Item 04 table:

Length and Width	Acc. Qty
c < 5.0, b< 0.4	Ignore

Item 05 table:

Length and Width	Acc. Qty
c > 3.0, b< 1.0	1
c< 3.0, b< 1.0	2
c< 3.0, b< 0.5	4
a<Glass Thickness	

Item 06 table:

Length and Width	Acc. Qty
c ≤0.6, b< 5.0	Ignore
aGlass Thickness	

No.	Item 项目	Criteria (Unit: mm) 标准
07	Glass Corner Chipping: (Minor defect) 玻璃切角:(小瑕疵)	<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>
08	Glass Burr: (Minor defect) 玻璃磨:(小瑕疵)	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>
09	FPC Defect: (Minor defect) FPC 缺陷:(小瑕疵)	9.1 Dent, pinhole width a<w/3. (w: circuitry width.) 9.2 Open circuit is unacceptable. 9.3 No oxidation, contamination and distortion.
10	Screen deformation 屏幕上的变形	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
11	Bubble on Polarizer (Minor defect) 偏光片上的气泡(小瑕疵)	<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>
12	Dent on Polarizer (Minor defect) 偏光片上的凹痕(小瑕疵)	<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>

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

No.	Item 项目	Criteria (Unit: mm) 标准
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	10times	--	*2, *3
	150pF, 330Ω, ±6KV, Air			
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 HuaXia RGB Display and customer, HuaXia RGB Display will replace or repair any of its LCD and LCM which HuaXia RGB Display found to be defective electrically and visually when inspected in accordance with HuaXia RGB Display Quality Standards, for a period of one year from date of shipment.

12.5.2 The warranty liability of HuaXia RGB Display is limited to repair and/or replacement. HuaXia RGB Display 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 HuaXia RGB Display 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
GC9B71	IC Data sheet	V1.0
panel 1.89 寸　320X386	LCM assembly drawing	V1