华芯科技有限公司
HUAXIN TECHNOLOGY CO.,LTD

SPECIFICATION
FOR
LCD MODULE

Customer : _____

CustomerP/N _____

Model No. : ESHX046AQV8466ANT _____

Version : **1.0** _____

Date : **2022-06-08** _____

Final Approval by Customer

LCM Machinery OK ☐	Checked By	
LCM Display OK ☐	Checked By	
LCM NG ☐ LCM OK ☐	Approved By	

Confirmed :

DESIGN	CHECK	APPROVAL

Table of Contents

Revision History

Rev.	Issued Date	Description	Page	Editor
1.0	Jun.08,2022	First release	All	

1 General Specifications

Feature		Specifications
Display Spec.	Display Size(Diagonal)	4.58 inch
	Resolution (H*V)	320(RGB）×960
	LCD type	a-Si TFT
	Pixel Configuration	R.G.B. Vertical Stripe
	Display Mode	IPS/Transmissive/Normally Black
	Viewing Direction	All
Mechanical Characteristics	OutlineDimensions (H xV x T) (mm)	41.57(H) ×118.80(V)×2.54(T)
	Active Area(mm)	36.77 (H)×110.30(V)
	With /Without Touch screen	Without
	Match Connector Type	0.5 PITCH 40PIN
	Backlight Type	White LED
	Weight (g)	TBD
Electrical Characteristics	Interface	3SPI+18RGB
	Number of color	262K
	Driver IC	ST7701S

2   Pin Assignment

1	LED A	LED ANODE
2	LED K	LED CATHODE
3	LED K	LED CATHODE
4	GND	Ground
5	VCI	Power supply
6	RESET	Reset Signal ,Active Low
7	IM0	IM【1:0】 Interface
8	IM1	10 SPI+RGB
9	SDA	SPI Data signal
10	SCK	SPI Clock signal
11	CS	SPI Chip select signal
12	PCLK	RGB dot clock signal
13	DE	RGB data enable signal
14	VSYNC	RGB frame synchronizing signal
15	HSYNC	RGB line synchronizing signal
16~33	DB0~DB17	RGB data signal(DB0:B1UE LSB;DB5:BIUE MSB;DB6:GREEN LSB;DB11:GREEN,MSB;DB12:RED LSB;DB17:RED MSB)
34	GND	Ground
35	TP_INT（NC）	Touch Interrupt（NC）
36	TP_SDA NC）	Touch IIC Data signal（NC）
37	TP_SCL（NC）	Touch IIC Clock signal（NC）
38	TP_RESET（NC）	Touch Reset Signal（NC）
39	TP_VCI（NC）	Touch Power supply（NC）
40	GND	Ground

3   Absolute Maximum Ratings

GND=0V, Ta= 25℃

Item	Symbol	Value	Unit
Power supply voltage for logic	V_{DD}	-0.3~3.6	V
Input voltage	Vin	-0.3~V_{DD}+0.3	V
Operating temperature	Topr	-20 to 70	℃
Storage temperature	Tstg	-30 to 80	℃

4   Electrical Characteristics

4.1   DC Characteristics (VDD=2.8V,Ta=25℃)

Item	Symbol	Min	Type	Max	Unit	Test condition
Operating voltage	V_{DD}	2.5	2.8	3.6	V	-
Supply current	I_{DD}	-	-	5	mA	V_{DD}=2.8V,Ta=25°C
Input voltage	V_{IH}	0.7VDDI	-	VDDI	V	-
	V_{IL}	VSS	-	0.2VDDI	V	
Input leakage current	I_{IL}	-1.0	-	0.1	μA	-

Note: Voltage greater than above may damage the module.

All voltages are specified relative to VSS=0V.
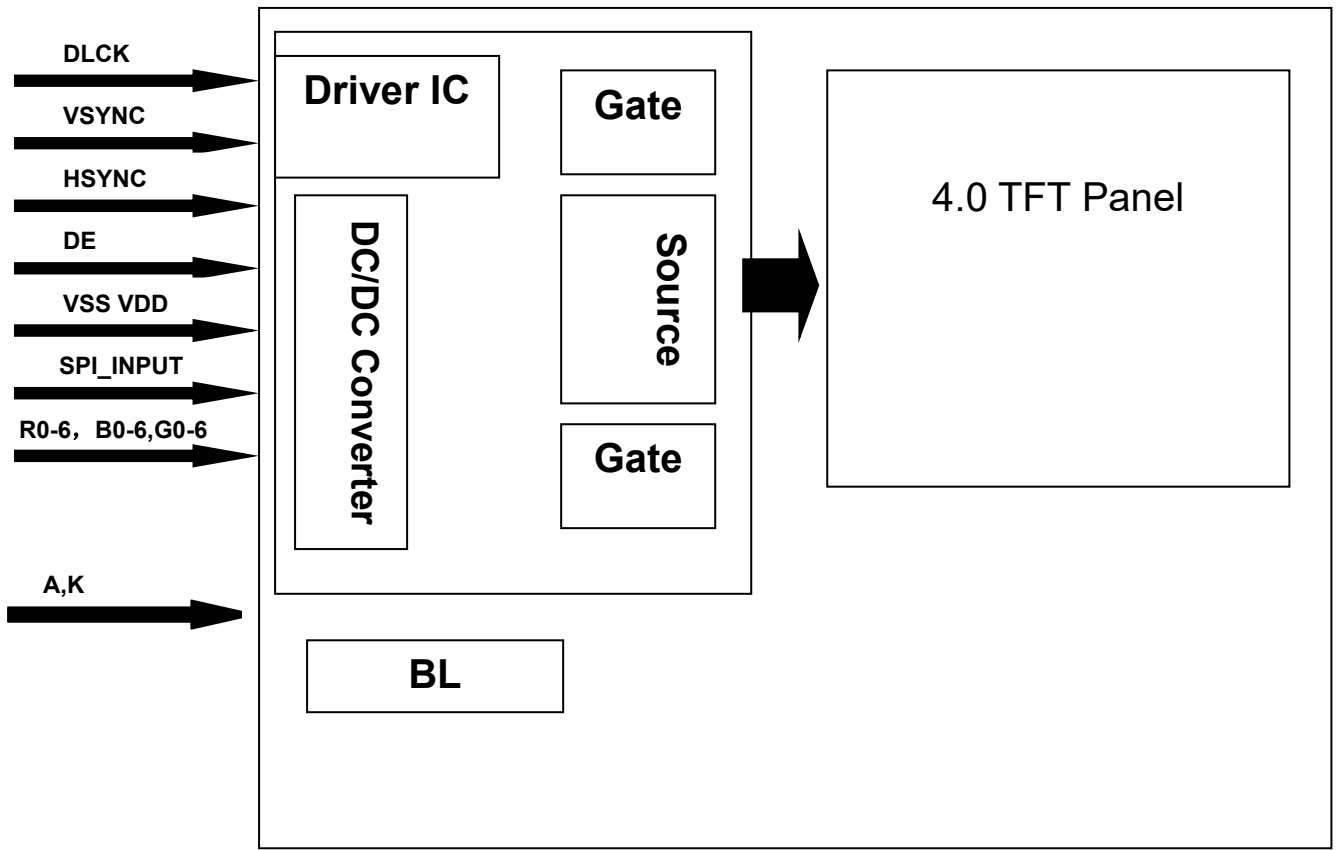
4.2   Driving Backlight

Ta=25℃

Item	Symbol	Min	Typ	Max	Unit	Remark
Forward Current	I_F	--	40		mA	
Forward Voltage	V_F	-	12	-	V	
Connection mode	P	--	4S2P	--		
LED number	/		8		pcs	

Note1: Optical performance should be evaluated at Ta=25℃ only .If LED is driven by high current, high ambient temperature & humidity condition. The life time of LED will be reduced. Operating life means brightness goes down to 50% initial brightness. Typical operating life time is estimated data.
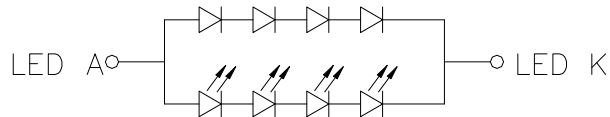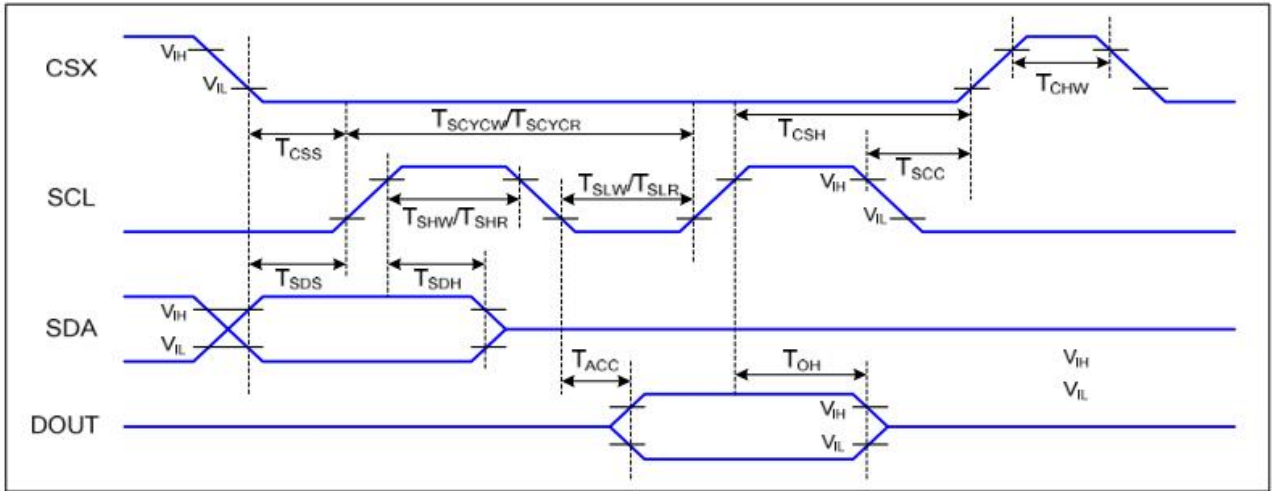

$$If=40mA \quad V=12V(TYP)$$

4.3   Block Diagram

DLCK

VSYNC

HSYNC

DE

VSS VDD

SPI_INPUT

R0-6，B0-6,G0-6

A,K

Driver IC

DC/DC Converter

Gate

Source

Gate

BL

4.0 TFT Panel

5 INTERFACE TIMING
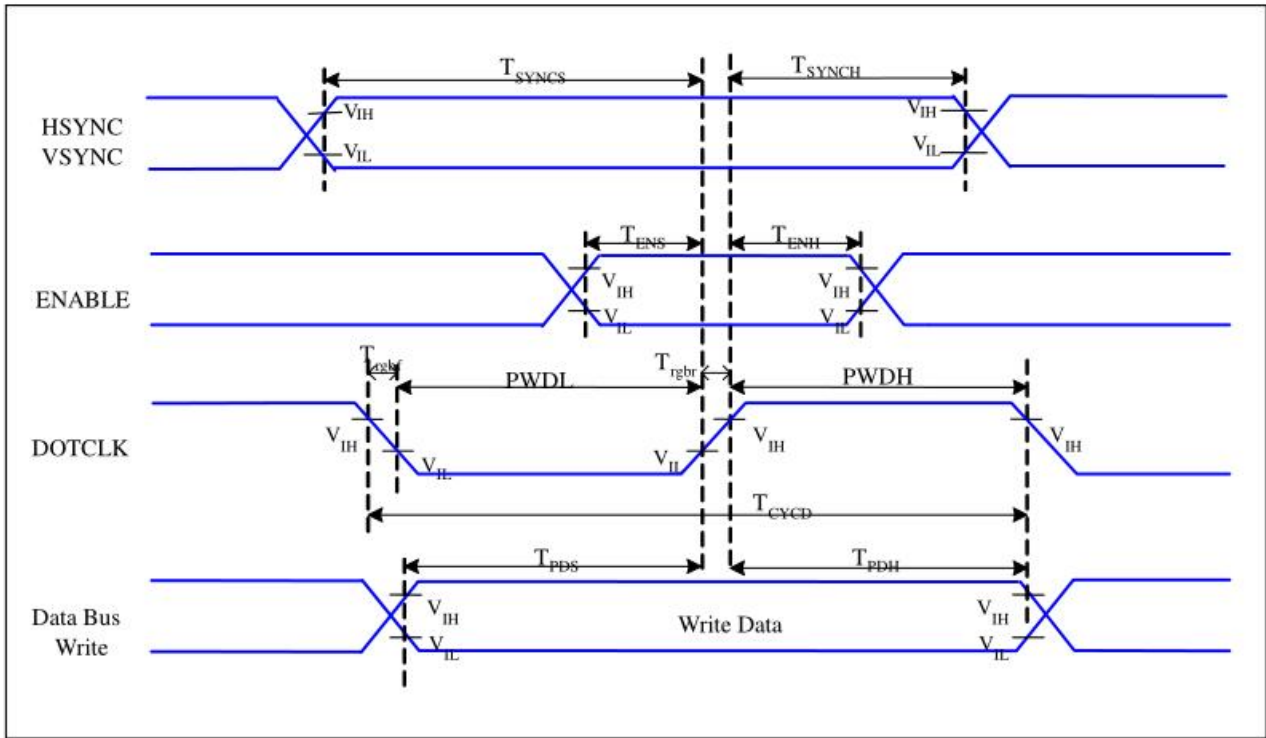
5.1 Serial Interface Characteristics (3-line serial):

3-line serial Interface Timing Characteristics

VDDI=1.8,VDD=2.8, AGND=DGND=0V, Ta=25℃

Signal	Symbol	Parameter	Min	Max	Unit	Description
CSX	T_{CSS}	Chip select setup time (write)	15		ns	
	T_{CSH}	Chip select hold time (write)	15		ns	
	T_{CSS}	Chip select setup time (read)	60		ns	
	T_{SCC}	Chip select hold time (read)	60		ns	
	T_{CHW}	Chip select "H" pulse width	40		ns	
SCL	T_{SCYCW}	Serial clock cycle (Write)	66		ns	
	T_{SHW}	SCL "H" pulse width (Write)	15		ns	
	T_{SLW}	SCL "L" pulse width (Write)	15		ns	
	T_{SCYCR}	Serial clock cycle (Read)	150		ns	
	T_{SHR}	SCL "H" pulse width (Read)	60		ns	
	T_{SLR}	SCL "L" pulse width (Read)	60		ns	
SDA	T_{SDS}	Data setup time	10		ns	
(DIN)	T_{SDH}	Data hold time	10		ns	

3-line serial Interface Characteristics

RGB Interface Characteristics :

RGB Interface Timing Characteristics
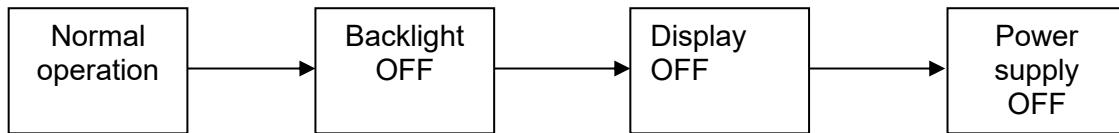
VDDI=1.8,VDD=2.8, AGND=DGND=0V, Ta=25 ℃

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
HSYNC, VSYNC	T_{SYNCS}	VSYNC, HSYNC Setup Time	5	-	ns	
ENABLE	T_{ENS}	Enable Setup Time	5	-	ns	
	T_{ENH}	Enable Hold Time	5	-	ns	
DOTCLK	PWDH	DOTCLK High-level Pulse Width	15	-	ns	
	PWDL	DOTCLK Low-level Pulse Width	15	-	ns	
	T_{CYCD}	DOTCLK Cycle Time	33	-	ns	
	Trghr, Trghf	DOTCLK Rise/Fall time	-	15	ns	
DB	T_{PDS}	PD Data Setup Time	5	-	ns	
	T_{PDH}	PD Data Hold Time	5	-	ns	

18/16 Bits RGB Interface Timing Characteristics

5.2 Power ON/OFF Timing

T2>200mS

Normal operation

T1<1mS

Backlight

90%

VDD

10%

GND

Power ON

Power OFF

| Power supply ON | → | Display ON | → | Backlight ON | → | Normal operation |

Power ON sequence

| Normal operation | → | Backlight OFF | → | Display OFF | → | Power supply OFF |
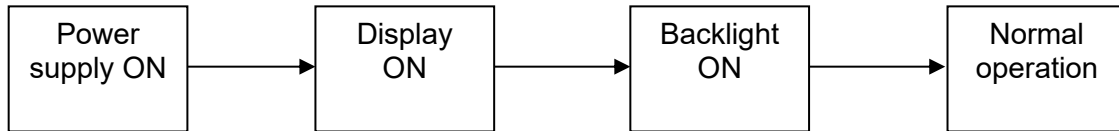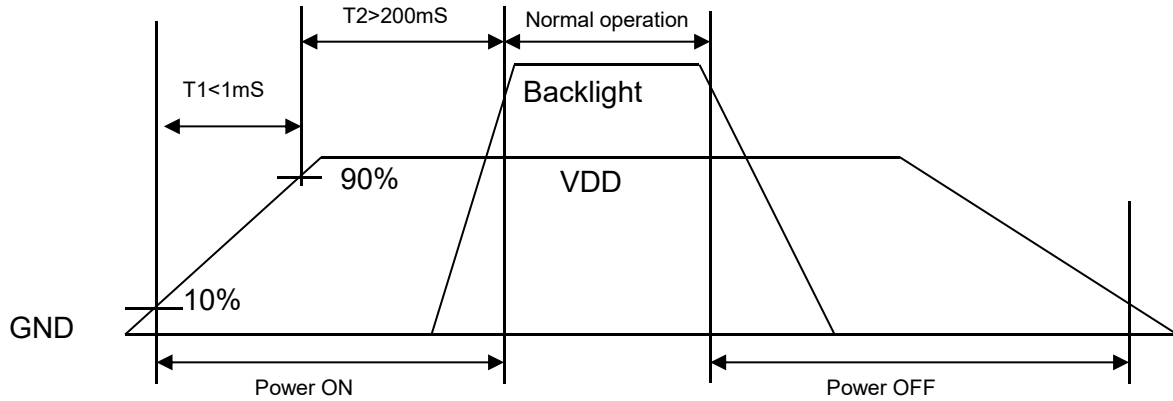
Power OFF sequence

6 Optical Characteristics

Ta=25℃

Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles	θT	CR≧10		85	-	Degree	Note 2
	θB			85	-		
	θL			88	-		
	θR			88	-		
Contrast Ratio	CR	θ=0°	1000	1500	-	-	Note1 Note3
Response Time	T_{ON}	25℃	-	30	40	ms	Note1 Note4
	T_{OFF}						
Uniformity	U	-		80	-	%	Note1 Note6
NTSC	-	-	60	65	-	%	Note 5
Luminance	L		350	400	-	cd/m^2	Note1 Note7

Test Conditions:

1. V_F=12V, I_F=40mA, the ambient temperature is 25℃.

2. The test systems refer to Note 1 and Note 2.

Note 1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 5 minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.
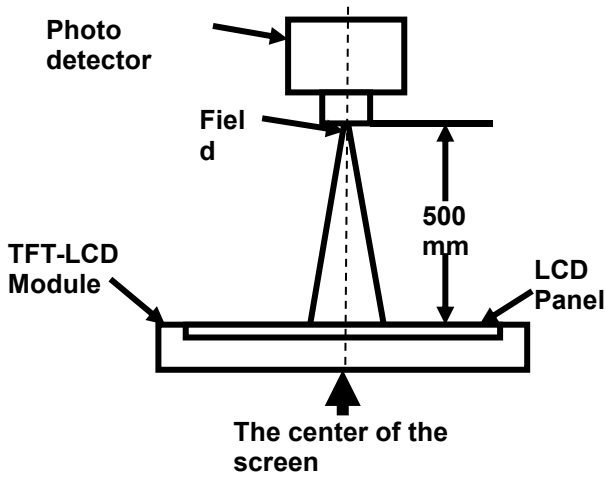
Item	Photo detector	Field
Contrast Ratio	SR-3A	1°
Luminance		
Chromaticity		
Lum Uniformity		
Response Time	BM-7A	2°

Note 2: Definition of viewing angle range and measurement system.

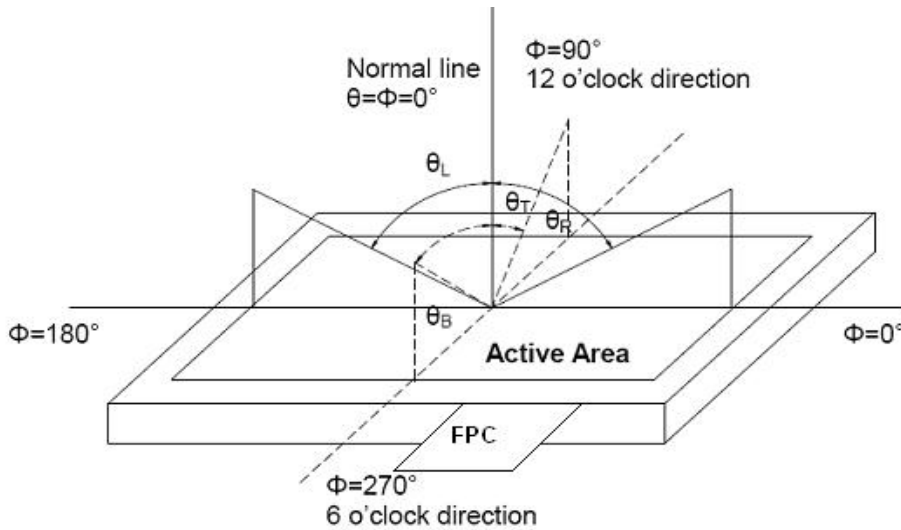viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80)。

Fig. 1 Definition of viewing angle

Note 3: Definition of contrast ratio

$$Contrast\ ratio\ (CR) = \frac{Luminance\ measured\ when\ LCD\ is\ on\ the\ "White"\ state}{Luminance\ measured\ when\ LCD\ is\ on\ the\ "Black"\ state}$$

"White state ":The state is that the LCD should be driven by Vwhite.

"Black state": The state is that the LCD should be driven by Vblack.

Vwhite: To be determined   Vblack: To be determined.

Note 4: Definition of Response time

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from 10% to 90%.
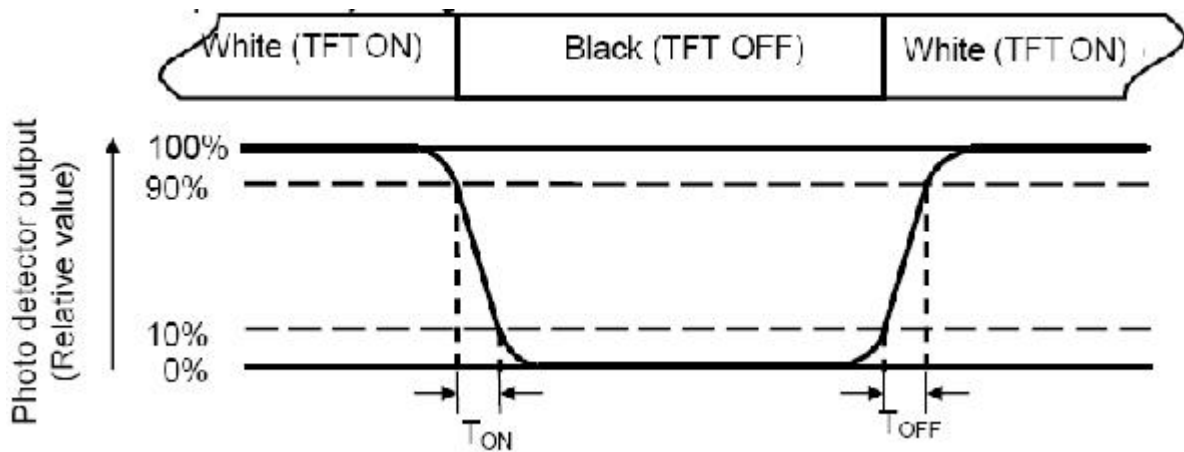
Note 5: Definition of color chromaticity (CIE1931)
Color coordinates measured at center point of LCD.

Note 6: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

Luminance Uniformity (U) = Lmin/ Lmax
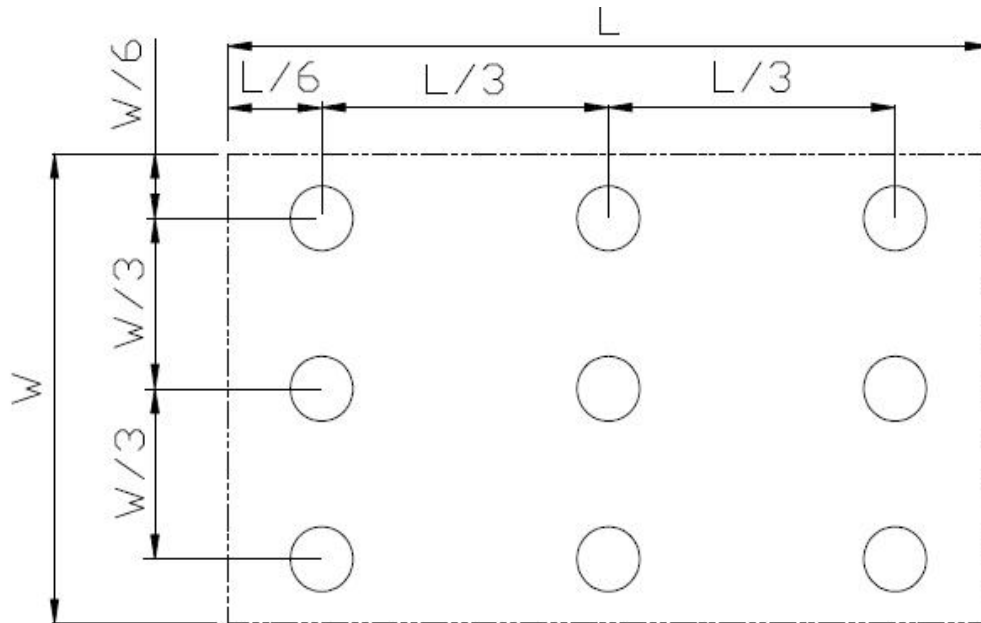
L-------Active area length W----- Active area width

Fig. 2 Definition of uniformity

Lmax: The measured maximum luminance of all measurement position.

Lmin: The measured minimum luminance of all measurement position.

Note 7: Definition of Luminance:

Measure the luminance of white state at center point.

7 Environmental / Reliability Test

Item	Condition	Time (hrs)	Assessment
High temp. Storage	80°C	120	No abnormalities in functions and appearance
High temp. Operating	70°C	120	
Low temp. Storage	-30°C	120	
Low temp. Operating	-20°C	120	
Humidity	40°C/ 90%RH	120	
Thermal Shock(Non-operation)	-20°C ← 25°C →70°C (0.5 hour ← 5 min → 0.5 hour)	10cycles	

Remark:

1.The test samples should be applied to only one test item.

2.Sample size for each test item is 1~10pcs.

3.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.

8 Mechanical Drawing

Front View   Side View   Back View

Notes:
1. Unit:mm.
2. ⚠ Modification rev.number.
3. All radii without dimension R0.3mm.
4. All draft angles to be 1.5°.
5. Unspecified Tolerances is :±0.20mm.
6. LCD Driver IC:ST7701S.
7. LCD Driver Voltage :2.8±0.3V
8. Color. :White
9. Operating Temperature : -20℃---- +70℃
10. Storage Temperature : -30℃---- +80℃
11. Requirements on Environmental Protection: ROHS HSF

If=40mA V=12V(TYP)

LED A○
○ LED K

弯折示意图
展开出货

接口说明：
1. VCI供电3.3V
2. 所有IO口电压也要3.3V
3. 接口选择如下：
IM[1:0] Interface
1 0   SPI+RGB

PIN SYMBLE table:

PIN	SYMBLE
1	LEDA
2	LEDK1
3	LEDK2
4	GND
5	VCI
6	RESET
7	IM1
8	IM0
9	SDA
10	SCK
11	CS
12	PCLK
13	DE
14	VSYNC
15	HSYNC
16~35	B0~DB17
34	GND
35	TP_INT
36	TP_SDA
37	TP_SCL
38	TP_IOVCC
39	TP_RESET
40	GND
1	GND
2	TP_INT
3	TP_SDA
4	TP_SCL
5	TP_IOVCC
6	TP_RESET
7	TP_VCI

DESIGN:(设计) HOU
CHECKED:(检查)
APPROVED:(批准)
Draw(日期) 2022.03.05
Page:(页数) 1/1
图纸视角:
CUSTOMER'S CODE:(客户型号)
SPECIFICATION 规格
EDITION:(版本号) 01

Customer Name: ????
Approval Date: ????
Approved By: ??

9 Precautions For Use of LCD Modules

9.1　　　Handling Precautions

9.1.1.1 The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

9.1.1.2 If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

9.1.1.3 Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

9.1.1.4 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

9.1.1.5 If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

－ Isopropyl alcohol

－ Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

－ Water

－ Ketone

－ Aromatic solvents

9.1.1.6 Do not attempt to disassemble the LCD Module.

9.1.1.7 If the logic circuit power is off, do not apply the input signals.

9.1.1.8 To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

9.1.1.9 Be sure to ground the body when handling the LCD Modules.

9.1.1.10　Tools required for assembly, such as soldering irons, must be properly ground.

9.1.1.11　To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

9.1.1.12　The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

9.1.1.13　Storage precautions

9.1.1.14　When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

9.1.1.15　The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:

9.1.1.16　The LCD modules should be stored in the room without acid, alkali and harmful gas.

9.2　　　Transportation Precautions

The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.