



晶采光電科技股份有限公司
AMPIRE CO., LTD.

SPECIFICATIONS FOR LCD MODULE

CUSTOMER	
CUSTOMER PART NO.	
AMPIRE PART NO.	AM-4801920ATZQW-00H
APPROVED BY	
DATE	

Approved For Specifications

Approved For Specifications & Sample

AMPIRE CO., LTD.

**4F., No.116, Sec. 1, Xintai 5th Rd., Xizhi Dist., New Taipei City 221,
Taiwan (R.O.C.)**

22181 新北市 汐止區 新台五路一段 116 號 4 樓(東方科學園區 A 棟)

TEL:886-2-26967269 , FAX:886-2-26967196 or 26967270

APPROVED BY	CHECKED BY	ORGANIZED BY

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2015/10/27	-	New Release	Lawlite
2016/08/03	4	Update Power supply voltage	Lawlite
	5	Update Current of power supply	
	11	Update Color chromaticity	

1. Features

8.8 TFT Liquid Crystal Display module is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This TFT LCD has a 8.8-inch diagonally measured active display area with 480 horizontal by 1920 vertical pixel array resolution.

2. PHYSICAL SPECIFICATIONS

Item	Specifications	Remark
LCD size	8.8 inch(Diagonal)	
Driver element	a-Si TFT active matrix	
Display resolution	480 (W) × 3(RGB) × 1920(H) dots	
Display mode	Normally Black	
Pixel pitch	0.114 (W) x0.114 (H) mm	
Active area	54.72 (W) x218.88 (H) mm	
Module size	64.3 (W) x231.3 (H) × 4.8 (D) mm	
Color arrangement	R.G.B Vertical stripe	
NTSC	50 (typ.)	
Surface Treatment	Hard -Coating	

3. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	MIN	MAX	Unit	Remark
Power supply voltage	V _{DD}	-0.5	4.0	V	(1),(2)
	V _{GH}	15	26	V	
	V _{GL}	-11.5	-4	V	
	AV _{DD}	7	12.5	V	
Operating Temperature	T _{OP}	-20	70	°C	(3),(4),(5),(6)
Storage Temperature	T _{ST}	-30	80	°C	

Note (1) Permanent damage may occur to the LCD module if beyond this specification.

Functional operation should be restricted to the conditions described under normal operating conditions.

Note (2) Operating temperature 25°C, humidity 55%RH.

Note (3) (T≤40°C) Note static electricity. Maximum wet bulb temperature at 39°C or less. (T>40°C) No condensation.

Note (4) There is a possibility of causing deterioration in the irregularity and others of the screen and the display fineness though the liquid crystal module doesn't arrive at destruction when using it at 70~80°C or -30~-20°C.

Note (5) There is a possibility of causing the fineness deterioration by the prolonged use in the (high temperature) humidity environment (60%RH or more).

Note (6) In the operating temperature item, the low temperature side is the ambient temperature regulations. The high temperature side is the panel surface temperature regulations.

4. ELECTRICAL SPECIFICATIONS

4.1 TFT LCD Module

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	VDD	3.0	3.3	3.6	V	
	VGH	19.0	20.0	21.0	V	
	VGL	-11	-10	-9	V	
	AVDD	11.8	12	12.2	V	
VCOM	VCOM	4.5	4.88	5.2	V	Note (1)
Input signal voltage	ViH	0.7 VDD	-	VDD	V	Note (2)
	ViL	0	-	0.3 VDD	V	
Current of power supply	IDD	-		35	mA	VDD =3.3V
	IADD	-		30	mA	AVDD=12V
	IGH	-		5	mA	VGH=18V
	IGL	-		-5	mA	VGL= -10V
	Ivcom	-		0.1	mA	Vcom= 4.16 V
Backlight unit						
LED current	IL	-	160	-	mA	(3) (4)(5)
LED voltage	VL	-	16	17.5	V	(3) (4)(5)
LED reverse voltage	VR	-	-	5	V	
LED forward current	IF	-	-	80	mA	

Note:

(1) Please adjust VCOM to make the flicker level minimum.

(2) RESET、STBYB

(3) Permanent damage may occur to the LCD module if beyond this specification.

Functional operation should be restricted to the conditions described under normal operating conditions.

(4) Ta =25±2°C

(5) Test Condition: LED current 140 mA. The LED lifetime could be decreased if operating IL is larger than 140mA.

4.2 HS Receiver DC Specification

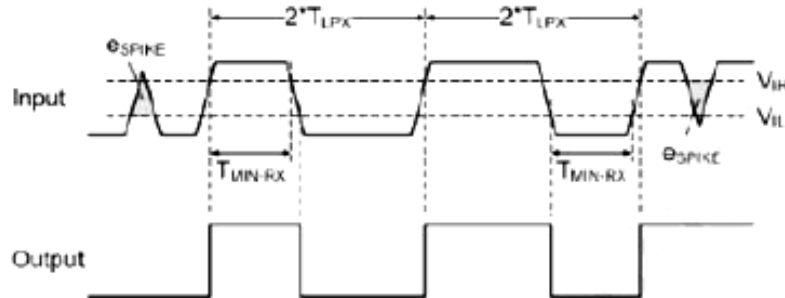
Parameter	Symbol	Rating			Unit	Note
		Min	Typ	Max		
Operation Voltage	VDD	1.5-10%	1.5	1.5+10%	mV	
Differential Input Voltage	VID	70	200	260	mV	
Common Mode Voltage	V _{CMRX(DC)}	70	-	330	mV	
Differential Input High Threshold Voltage	VTH	-	-	70	mV	
Differential Input Low Threshold Voltage	VTL	-70	-	-	mV	
Singled-ended input high voltage	V _{IHHS}	-	-	460	mV	
Singled-ended input low voltage	V _{ILHS}	-40	-	-	mV	
Singled-ended threshold for HS termination enable	V _{TERM-EN}	-	-	450	mV	
Differential input impedance	Z _{ID}	80	100	125	ohm	
Pin leakage current	I _{LEAK}	-10	-	10	uA	
Common-mode interference beyond 450MHz	ΔV _{CMRX(HF)}	-	-	100	mV	
Common-mode interference 50MHz - 450MHz	ΔV _{CMRX(LF)}	-50	-	50	mV	
Common-mode termination	C _{CM}	-	-	60	pF	
Embedded Termination	R _T	90	100	110	ohm	2bits RT_SEL[1: 0] for termination resistor selection 00 → 200ohm 10 , 01 → 150ohm 11 → 100ohm (default) 1bit ERMR_EN for termination resistor enable TERMR_EN=0, termr disable R=(OPEN) TERMR_EN=1, termr enable

Note:

- (1) Excluding possible additional RF interference of 100mV peak sine wave beyond 450MHz.
- (2) This table value includes a ground difference of 50mV between the transmitter and the receiver, the static common-mode level tolerance and variations below 450MHz.

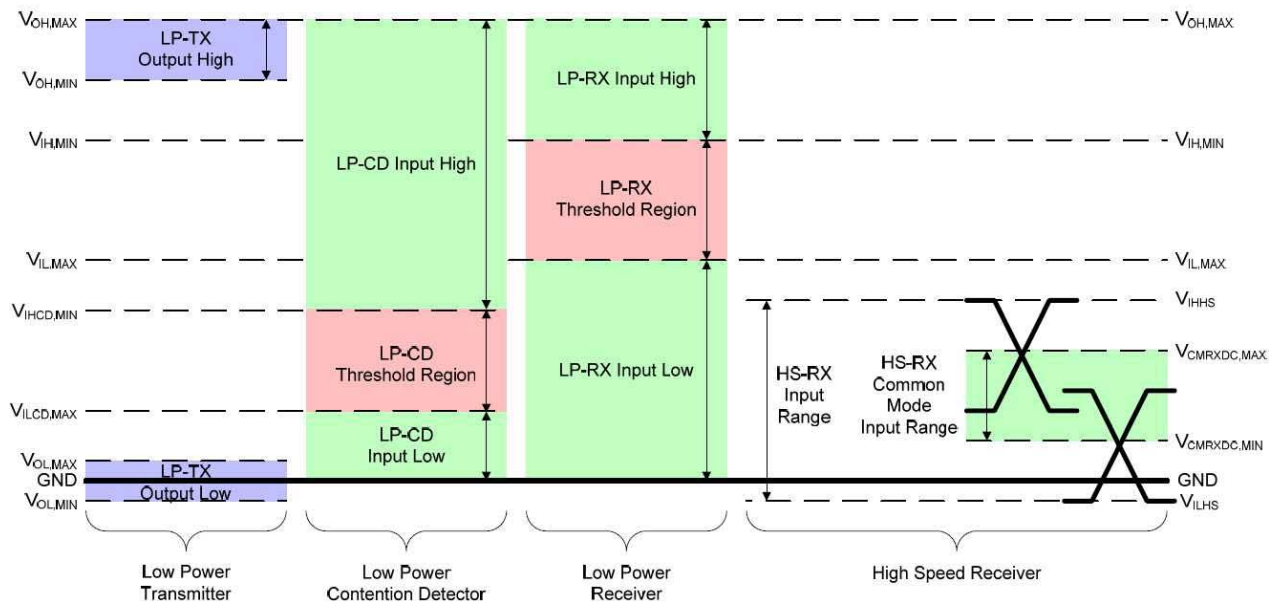
4.3 LP Receiver DC Specification

Parameter	Symbol	Rating			Unit	Note
		Rating				
		Min	Typ	Max		
Logic 1 input voltage	V_{IH}	880	-	-	mV	
Logic 0 input voltage, not in ULP State	V_{IL}	-	-	550	mV	
Input hysteresis	V_{HYST}	25	-	-	mV	



4.4 Line Contention Detection

Parameter	Symbol	Rating			Unit	Note
		Min	Typ	Max		
Logic 1 contention threshold	V_{IHCD}	450	-	-	mV	
Logic 0 contention threshold	V_{ILCD}	-	-	200	mV	

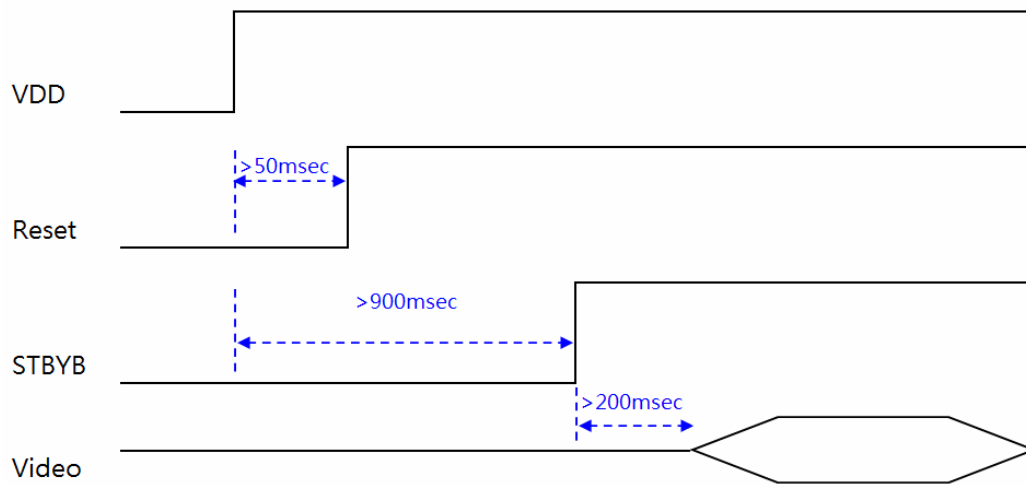
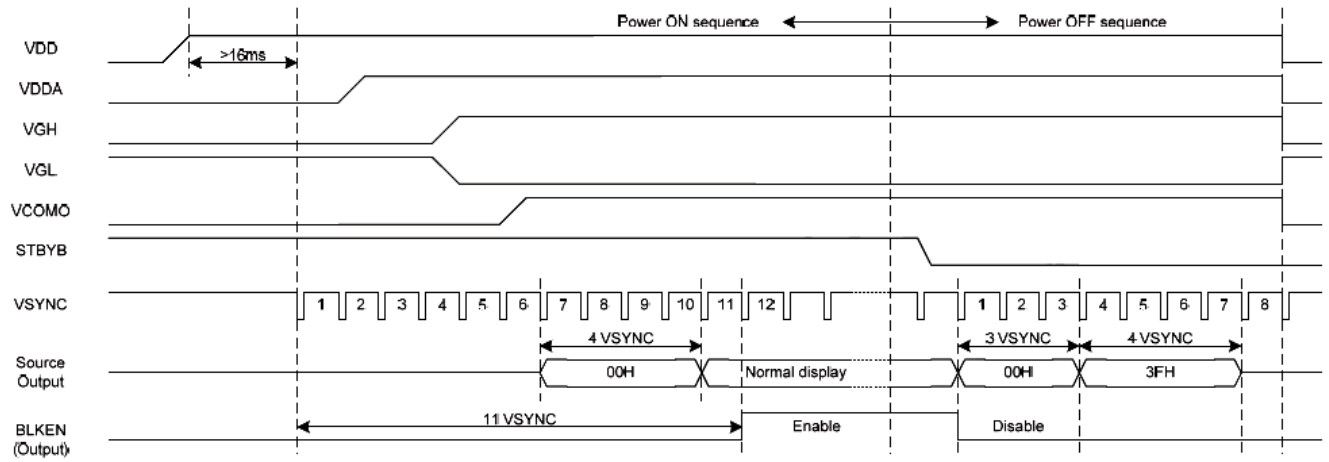


4.5 Interface Timing

Item	Symbol	Min.	Typ.	Max.	Unit
MIPI Video data rate(4 lane)	-	-	397.7	-	Mbps
PCLK Frequency	FPCLK	-	66.3	-	MHz
Horizontal Synchronization	Hsync	-	30	-	PCLK
Horizontal Back Porch	HBP	-	30	-	PCLK
Horizontal Front Porch	HFP	-	30	-	PCLK
Hsync+HBP+HFP	-	75	90	-	PCLK
HorizontalAddress(Display Area)	Hadr	-	480	-	PCLK
Horizontal cycle	-	555	570	-	PCLK
Vertical Synchronization	Vsync	-	6	-	Line
Vertical Back Porch	VBP	-	6	-	Line
Vertical Front Porch	VFP	-	6	-	Line
Vsync+VBP+VFP	-	15	18	-	Line
Vertical Address(Display Area)	Vadr	-	1920	-	Line
Vertical cycle	-	1935	1938	-	Line
Frame Rate	-	-	60	-	Hz

4.6 Power On / Off Sequence

Power-On/Off Timing Sequence:



5. Interface

FPC connector is used for electronics interface. The recommended model is Hirose FH34SRJ-40S-0.5SH(50)

Pin No.	Symbol	I/O	Function
1	GND	P	Ground
2	NC	--	No connection
3	LED+	P	LED Anode
4	LED+	P	LED Anode
5	NC	--	No connection
6	LED-	P	LED Cathode
7	LED-	P	LED Cathode
8	NC	--	No connection
9	GND	P	Ground
10	NC	--	No connection
11	AVDD	P	Power supply for analog circuit
12	NC	--	No connection
13	VGH	P	Power supply for analog circuit
14	NC	--	No connection
15	VGL	P	Power supply for analog circuit
16	NC	--	No connection
17	GND	P	Ground
18	VCOM	P	Power supply for common voltage
19	GND	P	Ground
20	GND	P	Ground
21	RESET	I	Global reset
22	VDD	P	Power supply for digital circuits
23	STBYB	I	Standby mode
24	TP_Sync	O	S ync signal for touch panel
25	GND	P	Ground
26	D0P	I	MIPI Data Input Lane0 positive-end
27	D0N	I	MIPI Data Input Lane0 negtive-end
28	GND	P	Ground
29	D1P	I	MIPI Data Input Lane1 positive-end
30	D2P	I	MIPI Data Input Lane1 negtive-end
31	GND	P	Ground
32	CLKP	I	MIPI Clock Input positive-end
33	CLKN	I	MIPI Clock Input negtive-end
34	GND	P	Ground
35	D2P	I	MIPI Data Input Lane2 positive-end
36	D2N	I	MIPI Data Input Lane2 negtive-end
37	GND	P	Ground
38	D3P	I	MIPI Data Input Lane3 positive-end
39	D3N	I	MIPI Data Input Lane3 negtive-end
40	GND	P	Ground

6. Optical Characteristics

6.1 CHARACTERISTICS

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast	CR	$\Theta=0$ Normal viewing angle	600	800	—		(1)(2)(4)
Response time	Tr+Tf		—	30	40	msec	(1)(3)
White luminance (Center)	Y_L		480	600	-	cd/m ²	(1)(4) ($I_L=160mA$)
Color chromaticity (CIE1931)	Red		R_x	0.576	0.626	0.676	c-light
			R_y	0.295	0.345	0.395	
	Green		G_x	0.262	0.312	0.362	
			G_y	0.493	0.543	0.593	
	Blue		B_x	0.097	0.147	0.197	
			B_y	0.059	0.109	0.159	
	White		W_x	0.250	0.300	0.350	
		W_y	0.272	0.322	0.372		
Viewing angle	Hor.	Θ_L	75	85	-	(1)(4)	
		Θ_R	75	85	-		
	Ver.	Θ_U	75	85	-		
		Θ_D	75	85	-		
Brightness uniformity	B_{UNI}	$\Theta=0$ (9point)	70	80	-	(5)	
View Direction	ALL						(6)

Note:

(1) Measuring surrounding : dark room

(2) LED current I_L : 160mA

(3) Ambient temperature : $25\pm 2^\circ C$

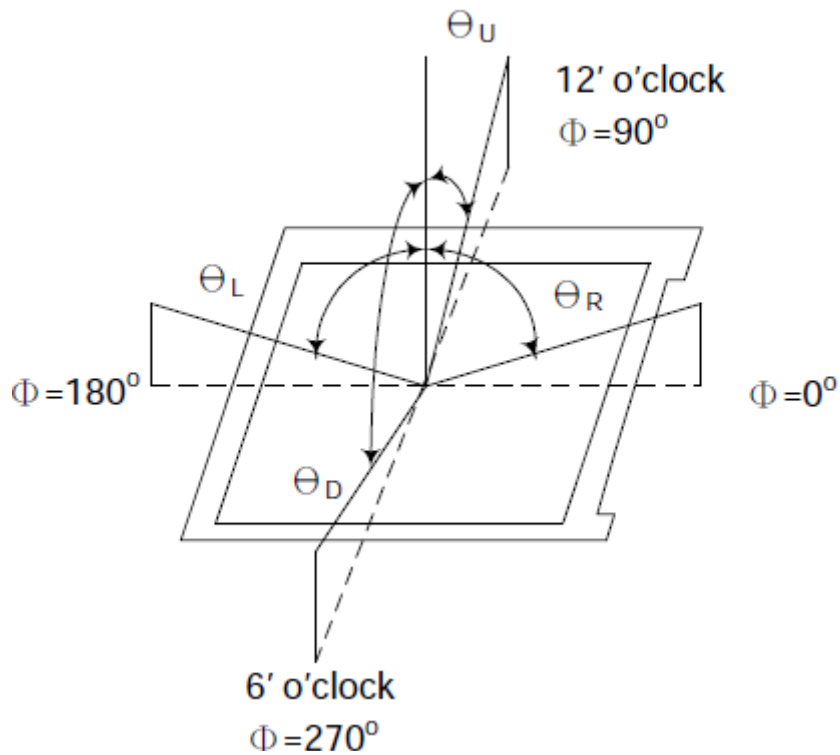
(4) 15min. warm-up time.

6.2 Measuring Equipment

- FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.

- Measuring spot size : 20 ~ 21 mm

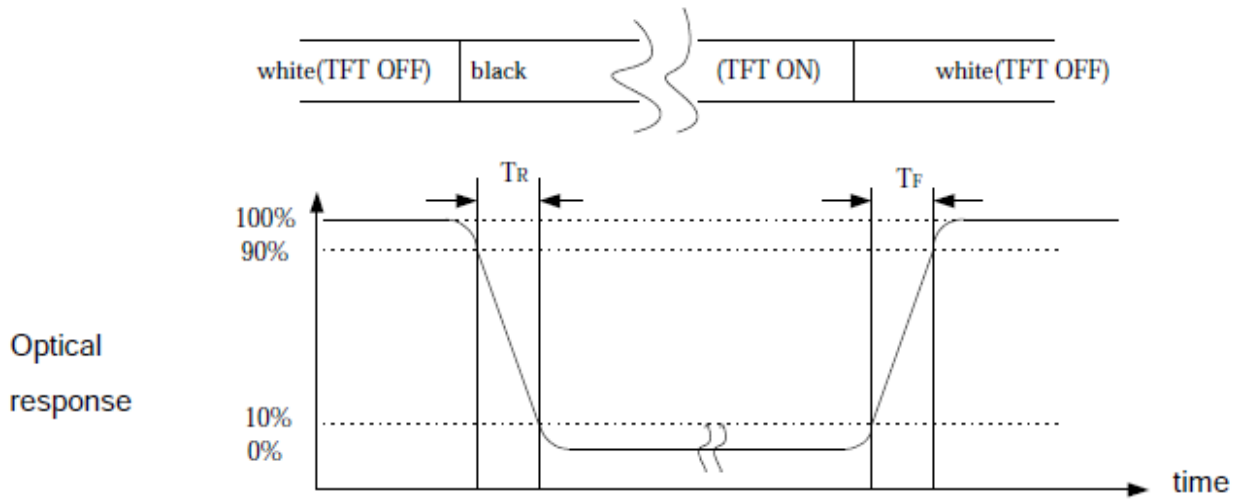
Note (1) Definition of Viewing Angle:



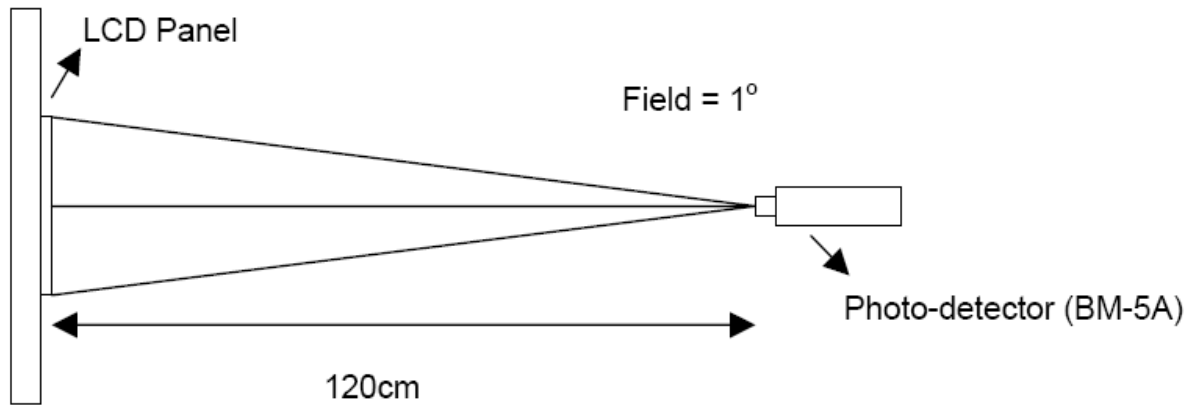
Note (2) Definition of Contrast Ratio (CR) :
measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

Note (3) Definition of Response Time : Sum of T_R and T_F

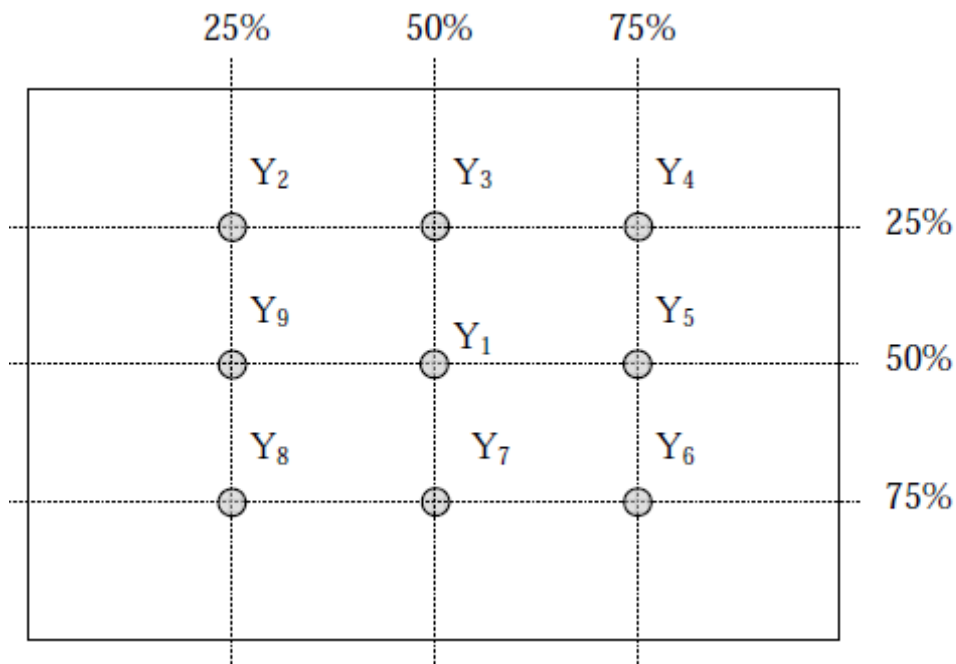


Note (4) Definition of optical measurement setup



Note (5) Definition of Average Luminance Uniformity of White (Center)

Definition of brightness uniformity

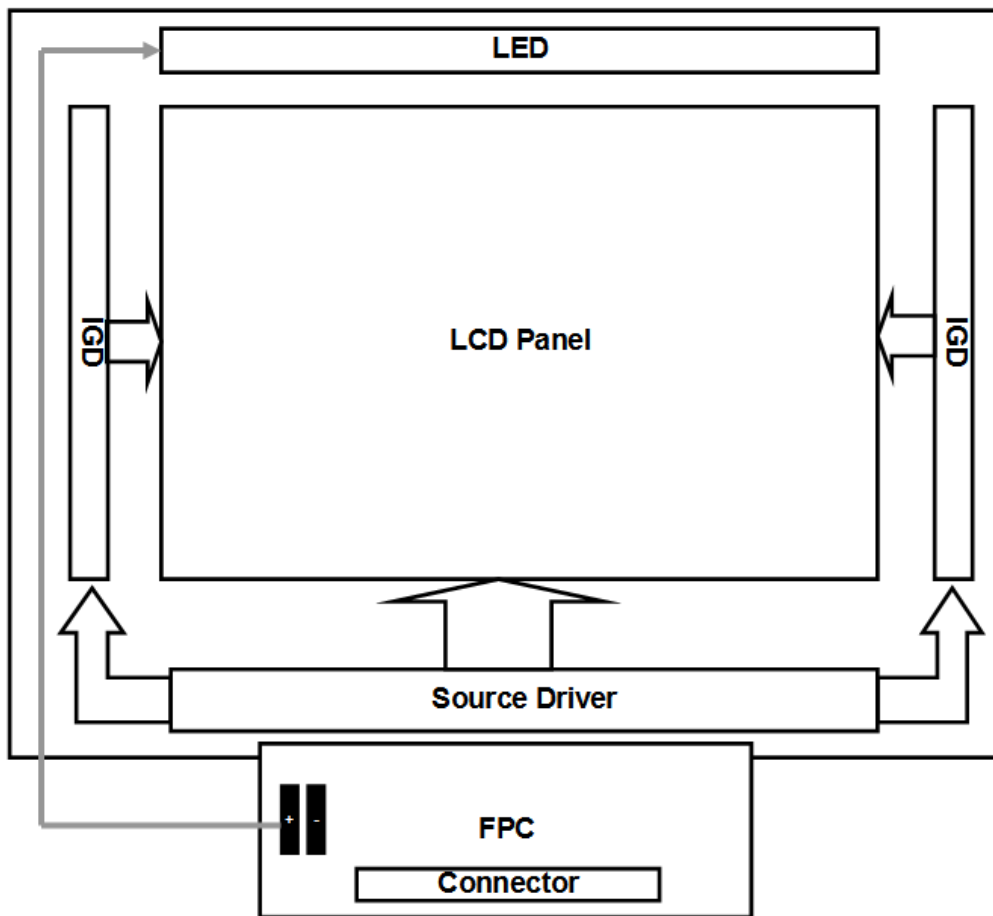


$$\text{Luminance uniformity} = \frac{(\text{Min Luminance of 9 points})}{(\text{Max Luminance of 9 points})} \times 100\%$$

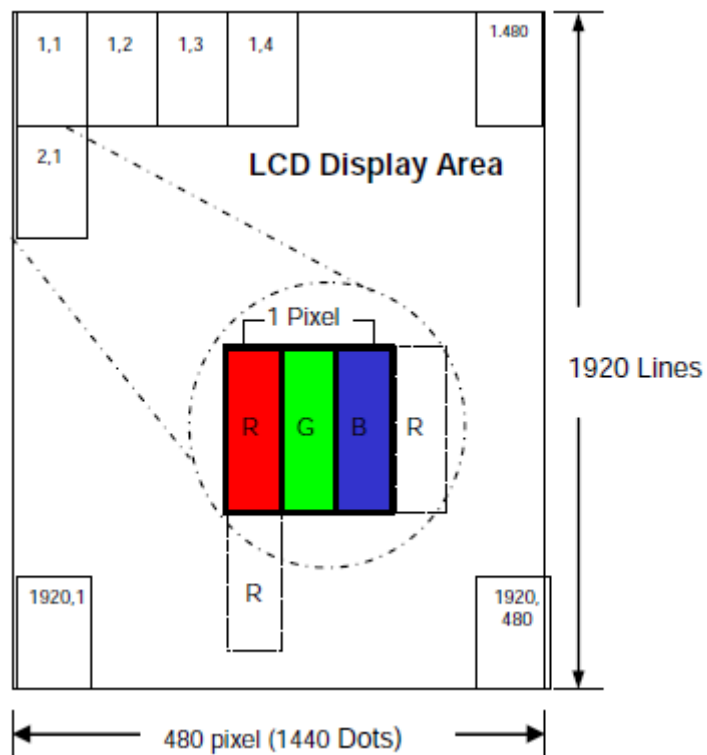
Note (6) Rubbing Direction (The different Rubbing Direction will cause the different optimal view direction.)

7. BLOCK DIAGRAM

7.1 TFT LCD Module



7.2 Pixel Format

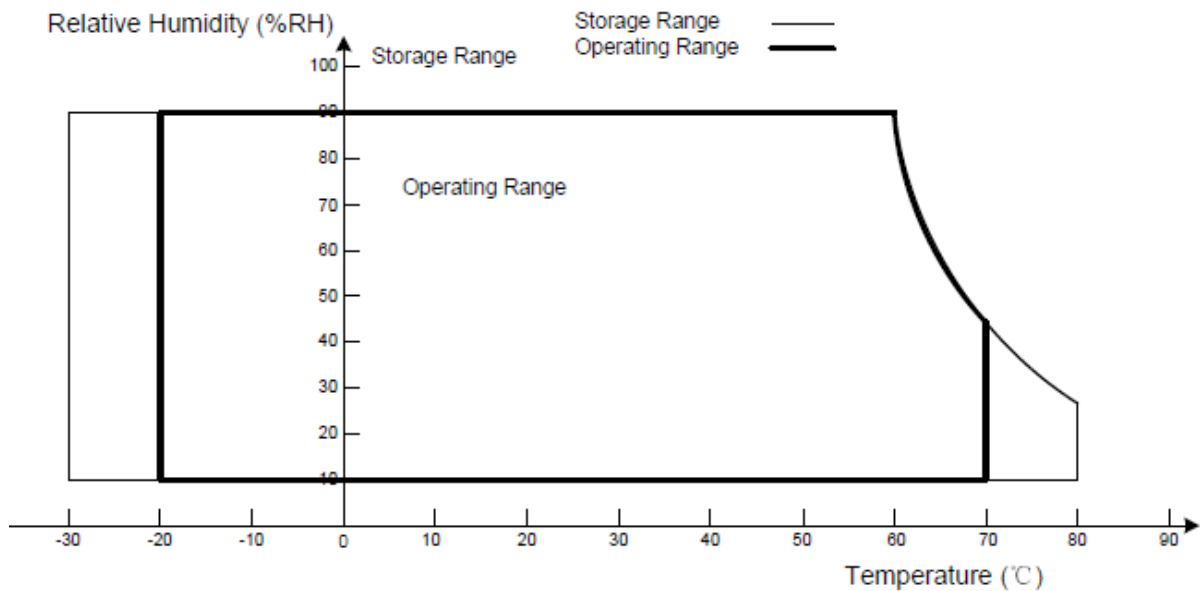


8. Reliability Conditions

No.	Item	Conditions	Remark
1	High Temperature Storage	Ta=+80°C, 240hrs	
2	Low Temperature Storage	Ta=-30°C, 240hrs	
3	High Temperature Operation	Ta=+70°C, 240hrs	
4	Low Temperature Operation	Ta=-20°C, 240hrs	
5	Thermal Cycling Test (non operation)	-20°C(30min)→+70°C(30min), 100 cycles	
6	Vibration	Sine Wave 1.5G, 5~500Hz, XYZ 30min/each direction	
7	Shock	Half-Sine, 200G, 2ms, ±XYZ, 1time	

Note: There is no display function NG issue occurred, all the cosmetic specification is judged before the reliability stress.

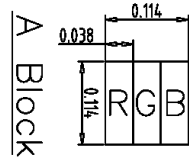
Storage / Operating temperature



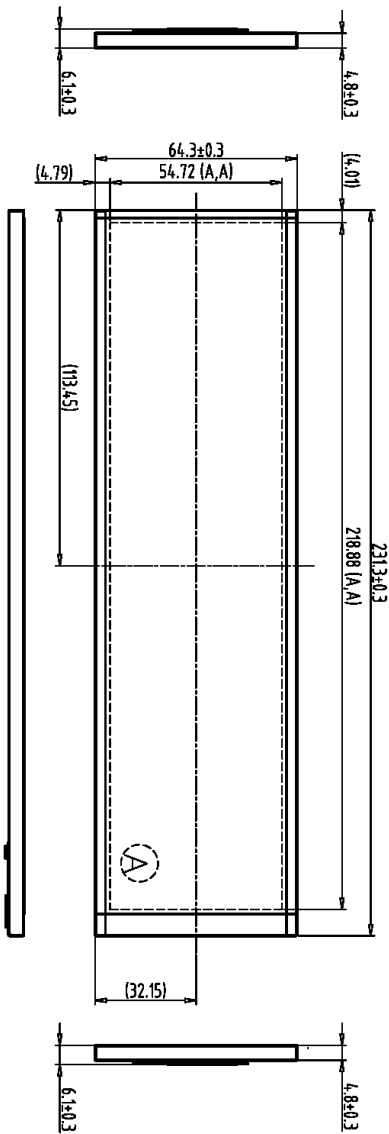
Note: Max wet bulb temp.=39°C

9. OUTLINE DIMENSION

REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	10-19-13	Wen



1	GND	21	RESET
2	NC	22	VDD
3	LED+	23	STBYB
4	LED+	24	TP_Sync
5	NC	25	GND
6	LED-	26	DOP
7	LED-	27	DON
8	NC	28	GND
9	GND	29	D1P
10	NC	30	D1N
11	AVDD	31	GND
12	NC	32	CLKP
13	VGH	33	CLKN
14	NC	34	GND
15	VGL	35	D2P
16	NC	36	D2N
17	GND	37	GND
18	YCOM	38	D3P
19	GND	39	D3N
20	GND	40	GND

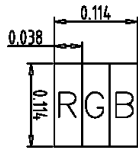


Note:
 1. Unless indicated, Tolerance "±0.5"
 2. CN1 Connector: FH34SRU-40S-0.5SH

1	7																				
2	8																				
3	9																				
4	10																				
5	11																				
6	12																				

AWM 晶采光電科技
 QUALITY
4801920A
 (8.8")
 DWG. NO. *151093MA
 SHEET 1 OF 1

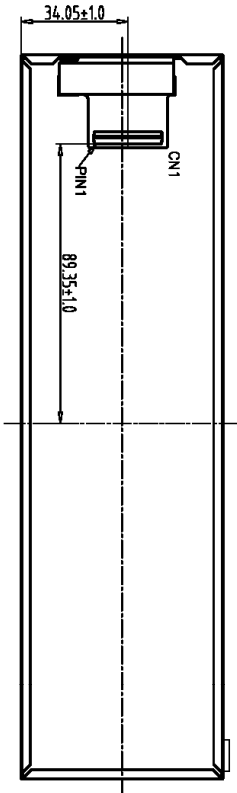
REV.	REVISION RECORD	DATE NAME
0	NEW RELEASE	10-19-13: Wen



A Block

1	GND	21	RESET
2	NC	22	VDD
3	LED+	23	STBYB
4	LED+	24	TP_Sync
5	NC	25	GND
6	LED-	26	DOP
7	LED-	27	DON
8	NC	28	GND
9	GND	29	D1P
10	NC	30	D1N
11	AND	31	GND
12	NC	32	CLKP
13	VGH	33	CLKN
14	NC	34	GND
15	VGL	35	D2P
16	NC	36	D2N
17	GND	37	GND
18	YCOM	38	D3P
19	GND	39	D3N
20	GND	40	GND

Note:
 1. Unless indicated, Tolerance "±0.5"
 2. CN1 Connector: FH34SRU-40S-0.5SH



Back view

1	7	TOLERANCE GRADIENT	A	B	DIM.	MAN	DWR.	DI-Wen	DATE	10-19-15	TITLE	4801920A
2	8				IE NO.		CHEK.		DATE		(8.8")	
3	9				PARTS NO.	LCM	APPD.		DATE		DWG. NO.	*151094MA
4	10				4801920A				DATE		SHEET	1 OF 1
5	11											
6	12											

AMPIRE 晶采光電科技

10. General Precaution

10.1 Use Restriction

This product is not authorized for use in life supporting systems, aircraft navigation control systems, military systems and any other application where performance failure could be life-threatening or otherwise catastrophic.

10.2 Disassembling or Modification

Do not disassemble or modify the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display. HannStar does not warrant the module, if customers disassemble or modify the module.

10.3 Breakage of LCD Panel

10.3.1. If LCD panel is broken and liquid crystal spills out, do not ingest or inhale liquid crystal, and do not contact liquid crystal with skin.

10.3.2. If liquid crystal contacts mouth or eyes, rinse out with water immediately.

10.3.3. If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.

10.3.4. Handle carefully with chips of glass that may cause injury, when the glass is broken.

10.4 Electric Shock

10.4.1. Disconnect power supply before handling LCD module.

10.4.2. Do not pull or fold the LED cable.

10.4.3. Do not touch the parts inside LCD modules and the fluorescent LED's connector or cables in order to prevent electric shock.

10.5 Absolute Maximum Ratings and Power Protection Circuit

11.5.1. Do not exceed the absolute maximum rating values, such as the supply voltage variation, input voltage variation, variation in parts' parameters, environmental temperature, etc., otherwise LCD module may be damaged.

11.5.2. Please do not leave LCD module in the environment of high humidity and high temperature for a long time.

11.5.3. It's recommended to employ protection circuit for power supply.

10.6 Operation

10.6.1 Do not touch, push or rub the polarizer with anything harder than HB pencil lead.

10.6.2 Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.

10.6.3 When the surface is dusty, please wipe gently with absorbent cotton or other soft material.

10.6.4 Wipe off saliva or water drops as soon as possible. If saliva or water drops contact with polarizer for a long time, they may causes deformation or color fading.

10.6.5 When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzine or other adequate solvent.

10.7 Mechanism

Please mount LCD module by using mounting holes arranged in four corners tightly.

10.8 Static Electricity

11.8.1 Protection film must remove very slowly from the surface of LCD module to prevent from electrostatic occurrence.

11.8.2 Because LCD module use CMOS-IC on circuit board and TFT-LCD panel, it is very weak to electrostatic discharge. Please be careful with electrostatic discharge. Persons who handle the module should be grounded through adequate methods.

10.9 Strong Light Exposure

The module shall not be exposed under strong light such as direct sunlight. Otherwise, display characteristics may be changed.

10.10 Disposal

When disposing LCD module, obey the local environmental regulations.