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-19201200HDTZQW-00H
APPROVED BY	
DATE	

☐ Preliminary Specification
☑ Formal Specification

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Approved by	Checked by	Organized by
Patrick	Simon	Tank

*This specification is subject to change without notice.

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2024/07/22	--	New Release	Tank

1.0 General Descriptions

1.1 Introduction

The model is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT LCD panel, a driving circuit and a back light system. This TFT LCD has a 10.1 (16:10) inch diagonally measured active display area with WXGA (1920 horizontal by 1200 vertical pixel) resolution.

1.2 Features

- 10.1 (16:10 diagonal) inch configuration
- 16.7M color LVDS interface
- RoHS Compliance.
- Viewing Direction: Forward Scanning

1.3 Product Summary

Items	Specifications	Unit
Screen Diagonal	10.1	Inch
Active Area	216.8(W) x 135.5(H)	mm
Pixel Format	1920 x (RGB)(H) x 1200(V)	-
Pixel Pitch	0.1128(H) x 0.1128(V)	mm
Pixel Arrangement	R.G.B. Vertical Stripe	-
Display Mode	Normally Black	-
Outline Dimensions	229.46(H) x 149.10(V) x 4.8(D) (Max)	mm
Electrical Interface (Logic)	LVDS	-
Support Color	16.7M	-

2.0 Absolute Maximum Ratings

2.1 Electrical Absolute Rating

2.1.1 TFT LCD Module

Item	Symbol	Min	Max	Unit	Conditions
Power Supply Voltage	VDDIN	-0.3	5.0	V	GND=0
	VGH	-0.3	42	V	
	VGL	-19	0.3	V	
	VGH-VGL	12	32	V	

2.1.2 Back-Light Unit

Item	Symbol	Min	TYP	Max	Unit	Note
Forward Voltage	Vf	14	14.3	14.5	V	(1),(2)
Forward Current	If	--	600	--	mA	(1),(2),(3)
Power Consumption	PBL	--	8.58	--	W	

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.

(2) Ta =25±2℃

(3) Test Condition: NA

2.2 Environment Absolute Rating

Item	Symbol	Min	Max	Unit	Note
Operating Temperature	T_{OP}	-30	80	℃	
Storage Temperature	T_{ST}	-30	80	℃	

3.0 Optical Characteristics

3.1 Optical specification:

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle （CR>10）	Horizontal	θL	(80)	(85)	-	degree	(1),(4)
		θR	(80)	(85)	-		
	Vertical	θT	(80)	(85)	-		
		θB	(80)	(85)	-		
Contrast Ratio	Center		(700)	(900)	-	-	(2),(4)
Response Time	Rising	Tr	-	25	-	ms	(3),(4)
	Falling	Tf	-	25	-	ms	
Color Chromaticity	Red	Rx	0.576	0.626	0.676	-	(4),(5),(6)
	Red	Ry	0.281	0.331	0.381	-	
	Green	Gx	0.285	0.335	0.385	-	
	Green	Gy	0.494	0.544	0.594	-	
	Blue	Bx	0.093	0.143	0.193	-	
	Blue	By	0.098	0.148	0.198	-	
	White	Wx	0.250	0.300	0.350	-	
	White	Wy	0.290	0.340	0.390	-	
White Luminance	Center		1200	1500	-	cd/m^2	(4),(5),(6)
Luminance Uniformity	BUNI		--	75	-	%	(4),(5),(6)

3.2 Measuring Condition

Measuring surrounding: dark room, LED current IL

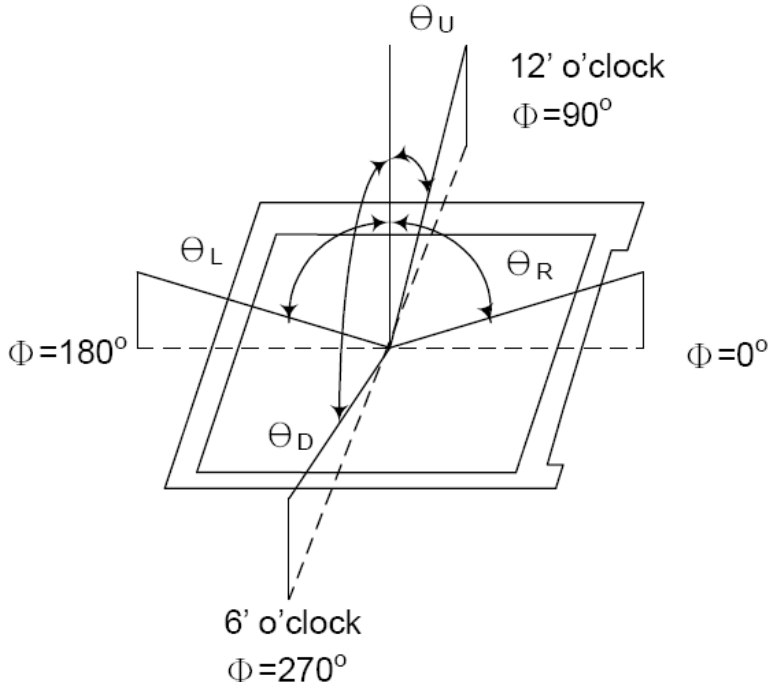
Ambient temperature: 25±2oC

15min. warm-up time.

3.3 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:

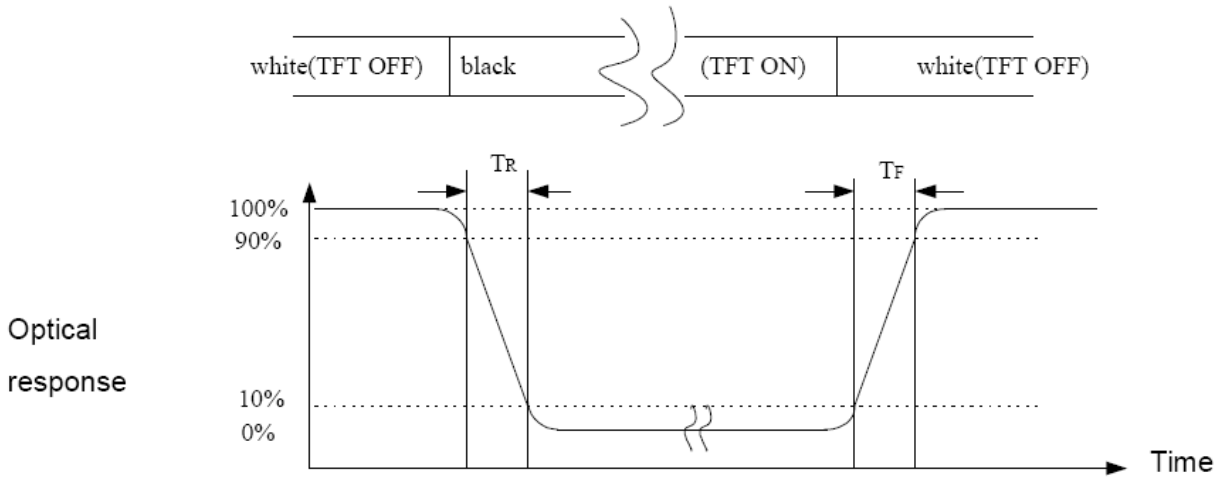


Note(2) Definition of Contrast Ratio (CR):

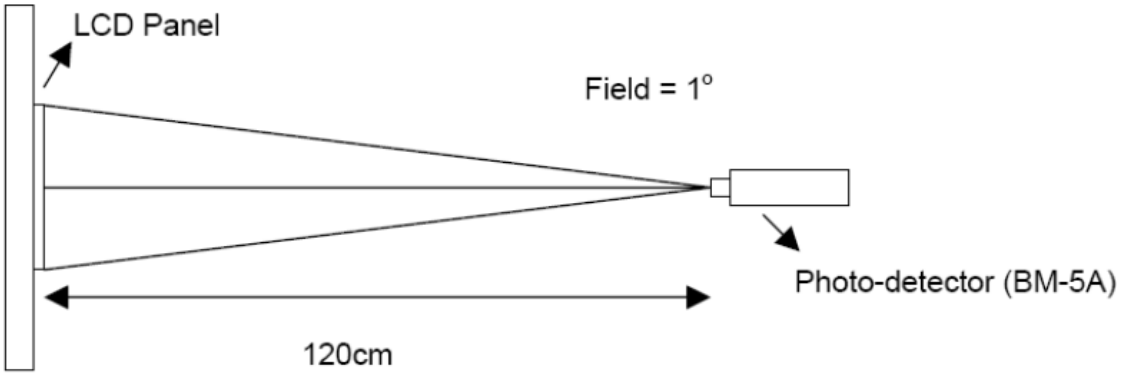
Measured at the center point of panel

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

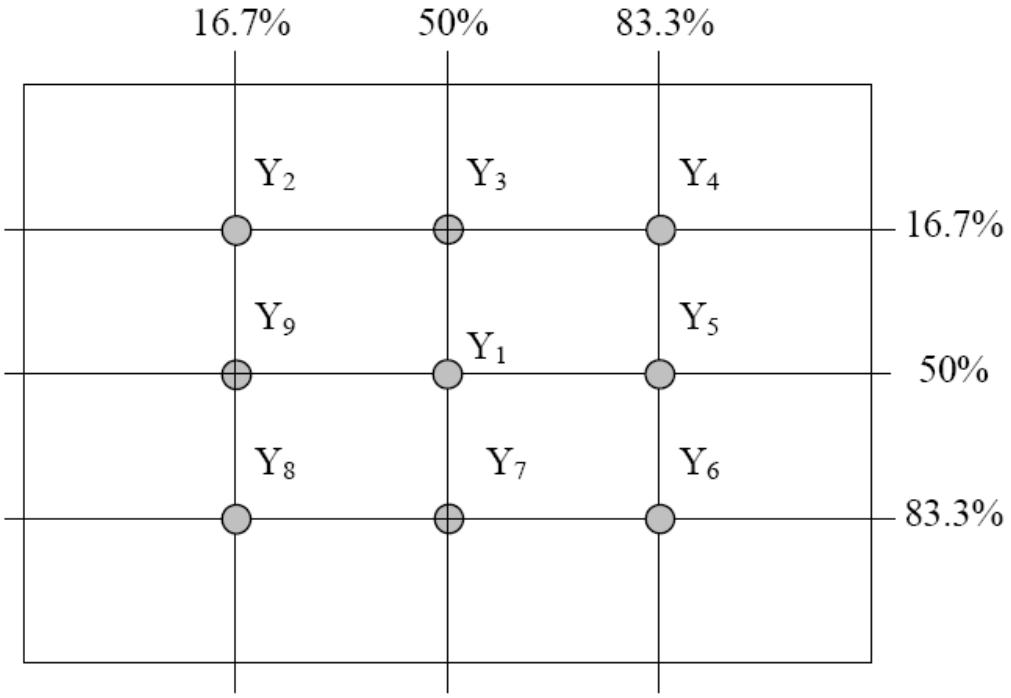
Note(3) Definition of Response Time: Sum of TR and TF



Note(4) Definition of Optical Measurement Setup



Note(5) Definition of brightness uniformity

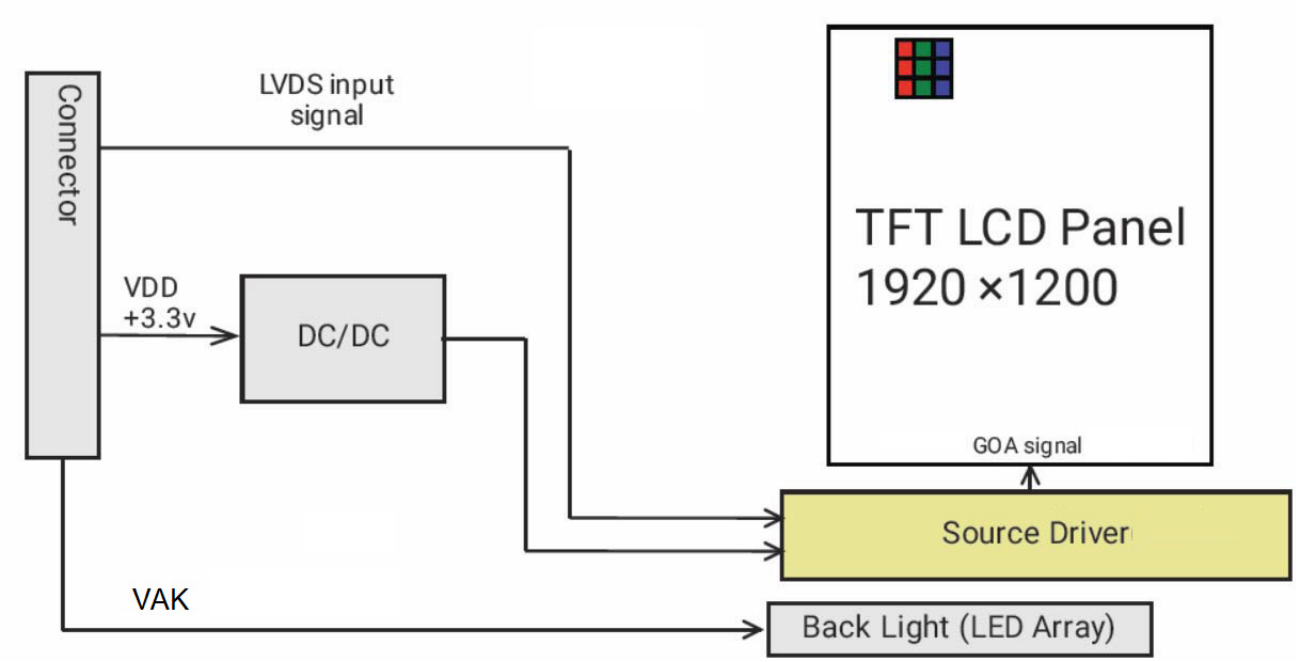


$$\text{Luminance uniformity} = \frac{\text{(Min Luminance of 9 points)}}{\text{(Max Luminance of 9 points)}} \times 100\%$$

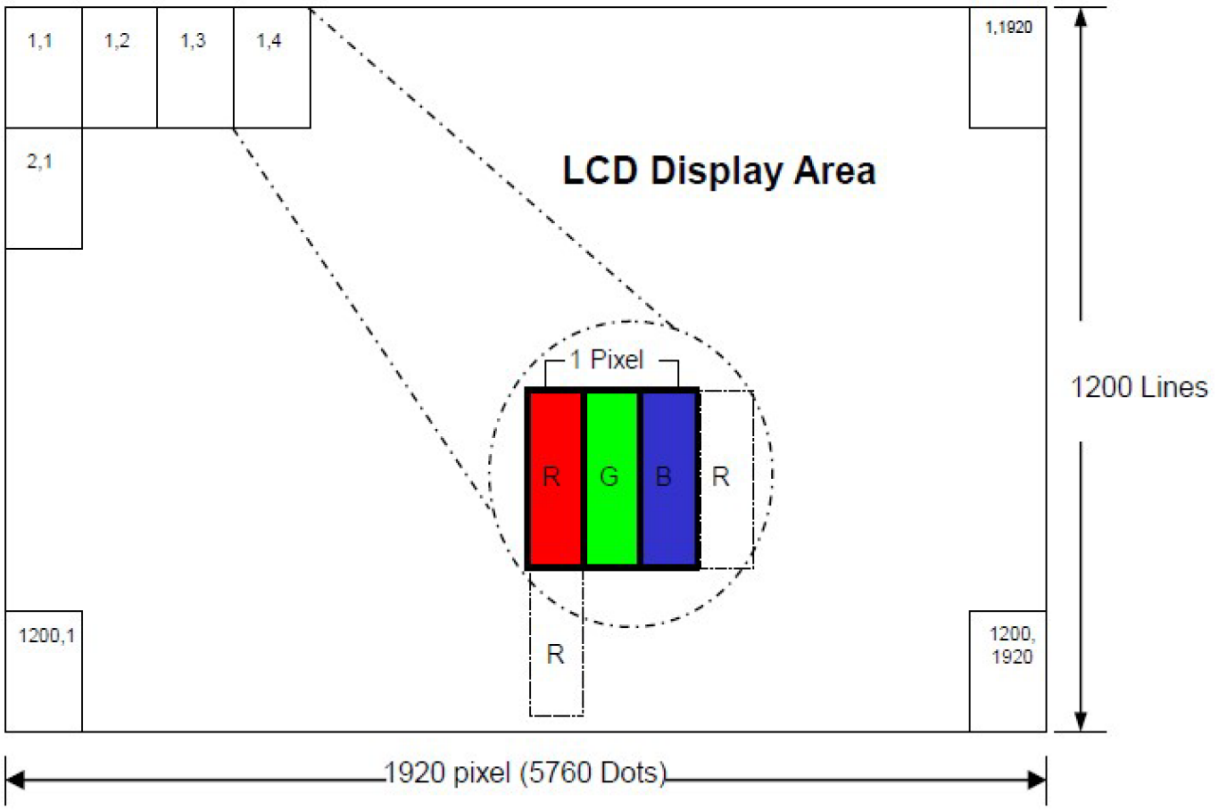
Note(6) Measured at the brightness of the panel when all terminals of LCD panel are electrically open.

4.0 Block Diagram

4.1 TFT LCD Module



4.2 Pixel format



5.0 Electrical Characteristics

45PIN connector is used for the module electronics interface the recommended model is

FH34SRJ-45S-0.5SH(45)(HRS) or equivalent

Pin #	Signal Name	I/O	Description	Remarks
1	VDDIN	P	Power for Analog Circuit(3.3V)	-
2	VDDIN	P	Power for Analog Circuit(3.3V)	-
3	VDDIN	P	Power for Analog Circuit(3.3V)	
4	VDDIN	P	Power for Analog Circuit(3.3V)	
5	VDDIN	P	Power for Analog Circuit(3.3V)	
6	GND	P	Ground	
7	NC	-	Not Connected	
8	NC	-	Not Connected	
9	NC	-	Not Connected	
10	GND	P	Ground	
11	OLV0N	I	-LVDS differential data input	
12	OLV0P	I	+LVDS differential data input	
13	GND	P	Ground	
14	OLV1N	I	-LVDS differential data input	
15	OLV1P	I	+LVDS differential data input	
16	GND	P	Ground	
17	OLVCLKN	I	-LVDS differential clock input	
18	OLVCLKP	I	+LVDS differential clock input	
19	GND	P	Ground	
20	OLV2N	I	-LVDS differential data input	
21	OLV2P	I	+LVDS differential data input	
22	GND	P	Ground	
23	OLV3N	I	-LVDS differential data input	
24	OLV3P	I	+LVDS differential data input	
25	GND	P	Ground	
26	ELV0N	I	-LVDS differential data input	
27	ELV0P	I	+LVDS differential data input	
28	GND	P	Ground	
29	ELV1N	I	-LVDS differential data input	
30	ELV1P	I	+LVDS differential data input	
31	GND	P	Ground	
32	ELVCLKN	I	-LVDS differential clock input	
33	ELVCLKP	I	+LVDS differential clock input	
34	GND	P	Ground	
35	ELV2N	I	-LVDS differential data input	
36	ELV2P	I	+LVDS differential data input	
37	GND	P	Ground	
38	ELV3N	I	-LVDS differential data input	
39	ELV3P	I	+LVDS differential data input	
40	GND	P	Ground	
41	NC	-	Not Connected	
42	NC	-	Not Connected	
43	NC	-	Not Connected	
44	NC	-	Not Connected	
45	NC	-	Not Connected	

I: Input, O: Output, P: Power

6.0 Electrical Characteristics

6.1 TFT LCD Module

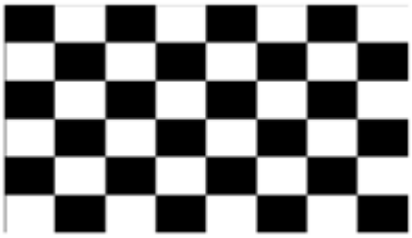
Item	Symbol	Min	TYP	Max	Unit	Note
Power Supply Voltage	VDD	3.0	3.3	3.6	V	GND=0
	VRP	--	--	300	mV	Ripple
Power Supply Current	IDD	--	600	800	mA	Note 1
Power Consumption	PLCD	--	2.0	2.88	W	Note 1
Rush Current	Iruch	--	--	3.0	A	Note 2
Input Logic High Voltage	VIH	0.7VDD	--	VDD	V	
Input Logic Low Voltage	VIL	0	--	0.3VDD	V	

Note 1

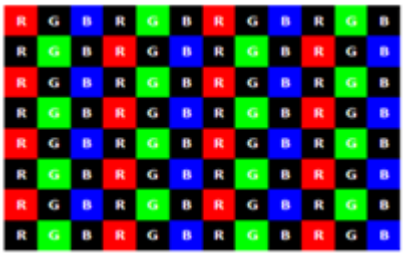
The supply voltage is measured and specified at the interface connector of LCM.

The current draw and power consumption specified is for VDD = 3.3V, Frame rate fv = 60Hz and Clock frequency = 80MHz. Test Pattern of power supply current.

a) Typ.: Mosaic 8 x 6 Pattern (L0/L255)



b) Max.: skip subpixel (L255)



Note 2

The duration of rush current is about 2ms and rising time of Power Input is 1ms (min.)

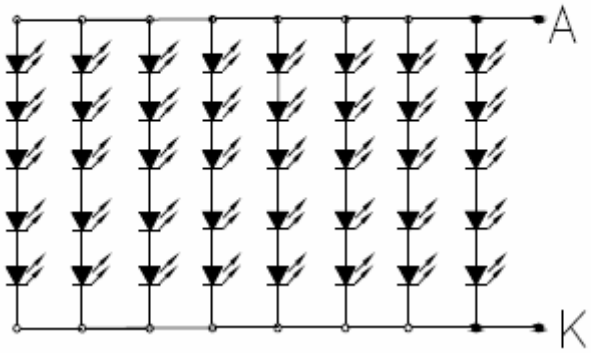
6.2 Back-Light Unit

The backlight system is an edge-lighting type with 40 LEDs.

The characteristics of the LED are shown in the following tables.

Item	Symbol	Min	TYP	Max	Unit	Note
LED Voltage	VL	14	14.3	14.5	V	
LED current	IL	--	600	--	mA	
Operating LED life time	Hr	50K	--	--	Hour	(1)

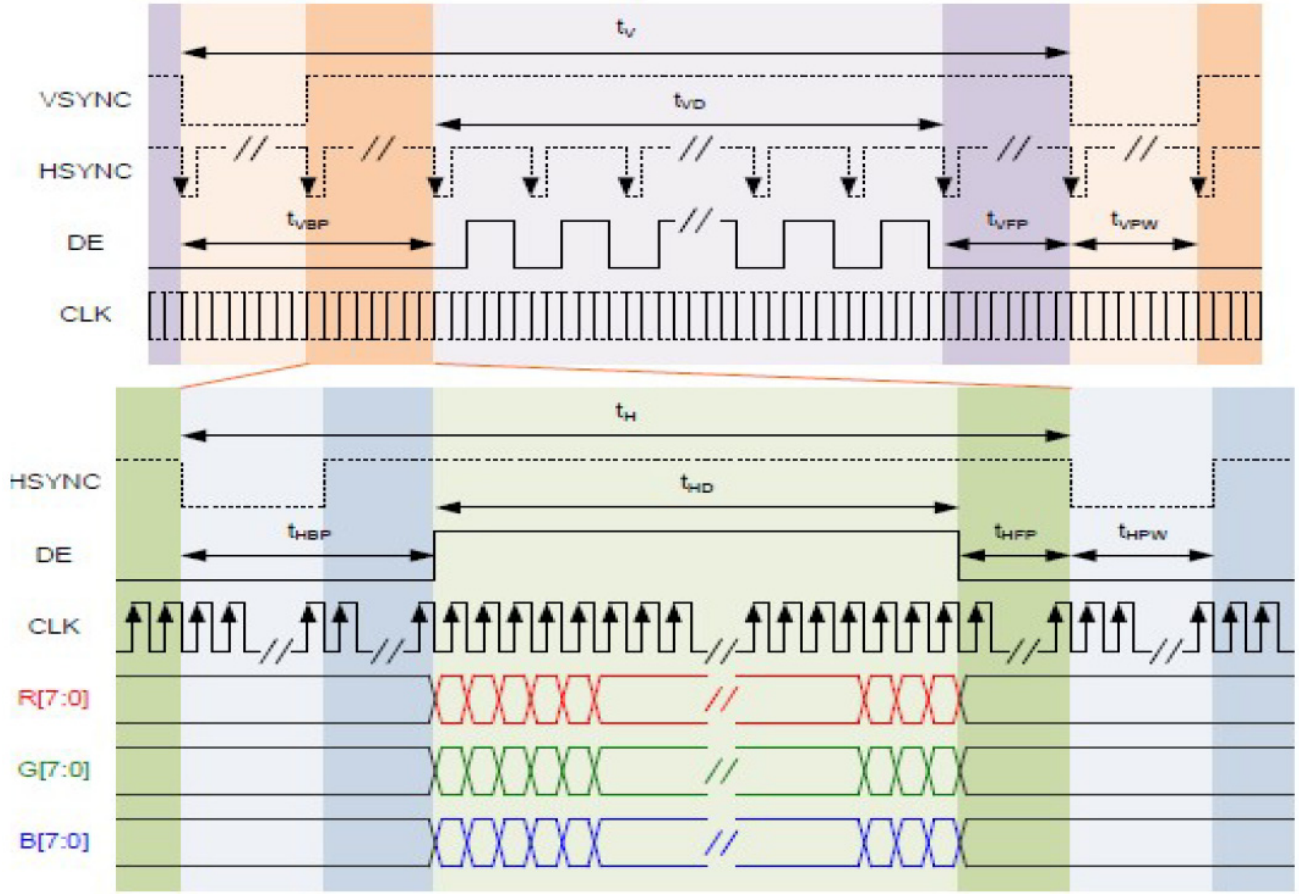
LED CIRCUIT DIAGRAM:



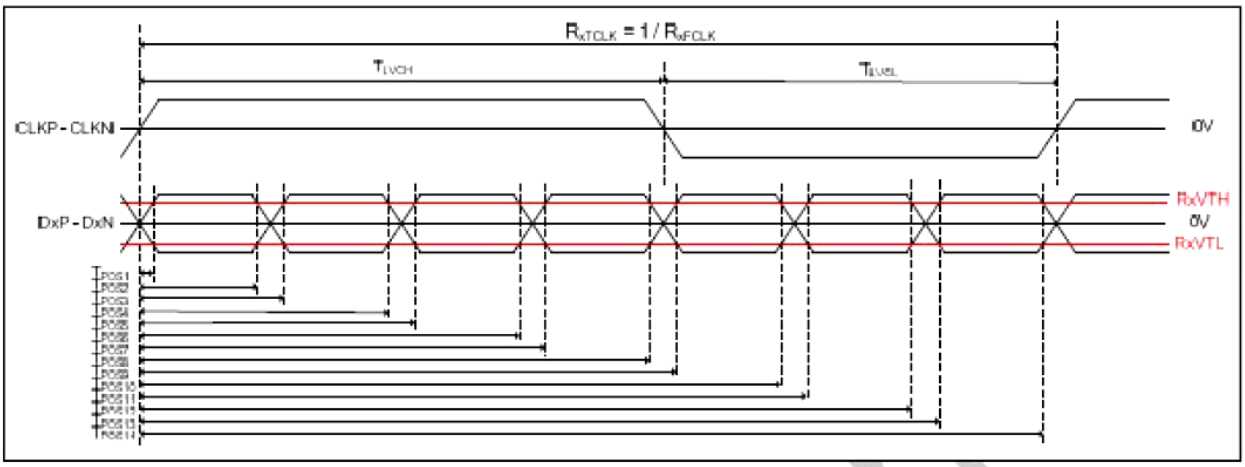
Note(1) The “LED life time” (Hr) is defined as the module brightness decrease to 50% original brightness at Ta=25℃. The LED lifetime could be decreased if operating IL is larger. The constant current driving method is suggested.

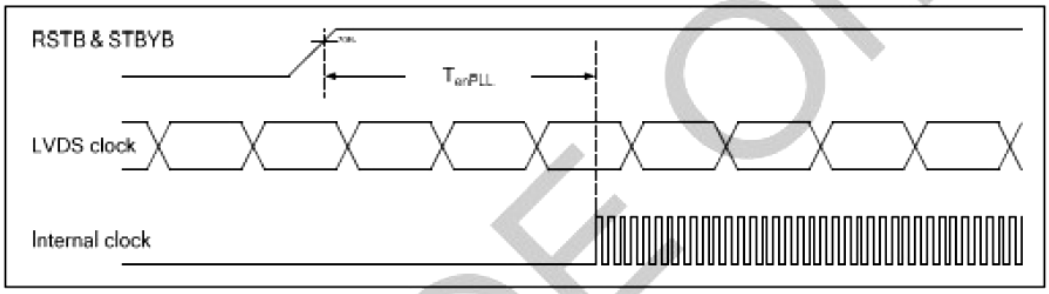
6.3 LVDS Signal Timing Diagram of Interface Signal

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Clock Frequency	fclk		76.8		MHz	Frame rate =60Hz
Horizontal display area	H_act		960		DCLK	
HSYNC period time	H_tol		1120		DCLK	
HSYNC Front porch	H_FB		24		DCLK	
HSYNC pulse width	H_pluse		48		DCLK	
Horizontal Blank	H_BP		88		DCLK	
Vertical display area	V_act		1200		H	
VSYNC period time	V_tol		1232		H	
VSYNC front porch	V_FP		3		H	
VSYNC Pluse width	V_pluse		12		H	
VSYNC back porch	V_BP		17		H	



6.4 LVDS AC Timing Specification



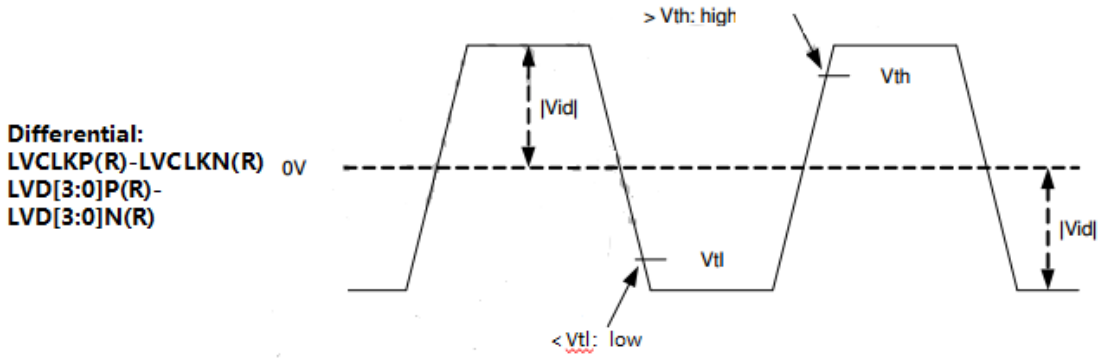


VSSI = VSSRX = VSSP = 0V, VDDI = VDDP= VDDRX = 3.0 ~ 3.3V, -40 ~ 85°C

Item	Signal	Symbol	Rating			Unit
			Min.	Typ.	Max.	
Clock Frequency	CLK	R_{xFCLK}	20	-	100	MHz
Clock Period		R_{xTCLK}	10	-	50	ns
1 data bit time		UI	-	1/7	-	R_{xTCLK}
Clock high time	CLK	T_{LVCH}		4		UI
Clock low time		T_{LVCL}		3		UI
Position 1	DATA	T_{POS1}	-0.25	0	0.25	UI
Position 2		T_{POS2}	0.75	-	1.25	
Position 3		T_{POS3}	0.75	1	1.25	
Position 4		T_{POS4}	1.75	-	2.25	
Position 5		T_{POS5}	1.75	2	2.25	
Position 6		T_{POS6}	2.75	-	3.25	
Position 7		T_{POS7}	2.75	3	3.25	
Position 8		T_{POS8}	3.75	-	4.25	
Position 9		T_{POS9}	3.75	4	4.25	
Position 10		T_{POS10}	4.75	-	5.25	
Position 11		T_{POS11}	4.75	5	5.25	
Position 12		T_{POS12}	5.75	-	6.25	
Position 13		T_{POS13}	5.75	6	6.25	
Position 14		T_{POS14}	6.75	-	7.25	
PLL wake-up time		TenPLL	-		150	us

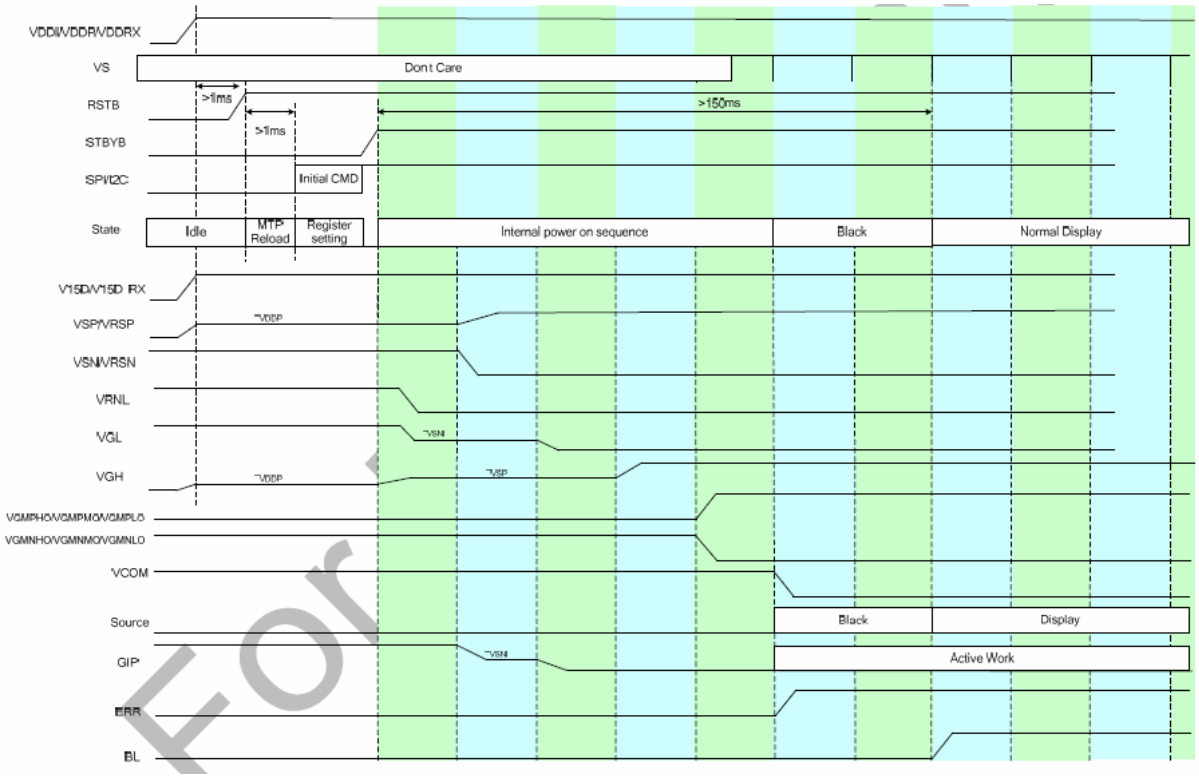
6.4.1 LVDS DC Timing Specification

Item	Symbol	Condition	MIN	TYP	MAX	Unit
Differential input high Threshold voltage	Vth	Vcm=1.2V	-	-	+0.1	V
Differential input low Threshold voltage	Vtl	-	-0.1	-	-	V
Differential input common Threshold voltage	Vcm	-	1	1.2	1.7-|Vid|/2	V
LVDS input voltage	Vinlv	-	0.7	-	1.7	V
Differential input voltage	|Vid|	-	0.35	-	0.6	V
Differential input leakage voltage	Ilvleak	-	-10	-	+10	uA

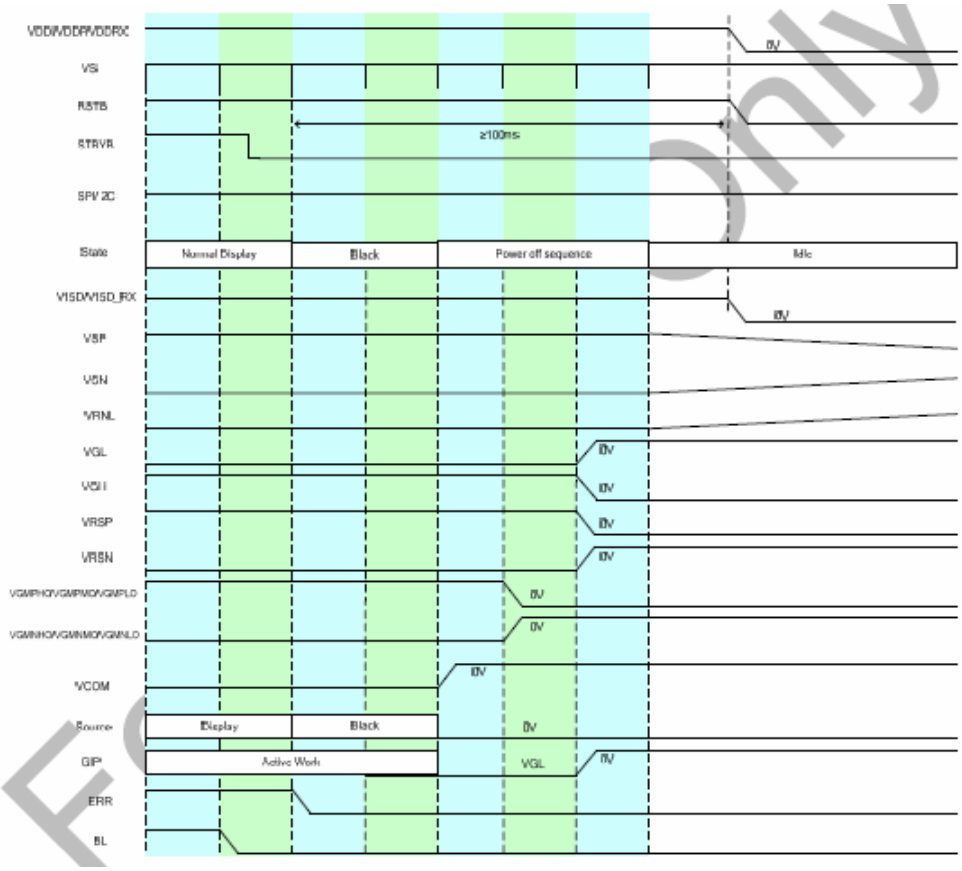


6.5 Power ON/OFF Sequence

6.5.1 Power ON



6.5.2 Power Standby and Power Off



7.0 Reliability Test Conditions

Test Item	Test Conditions	Note
High Temperature Operation	80±3°C, Dry t=240 hrs	
Low Temperature Operation	-30±3°C, Dry t=240 hrs	
High Temperature Storage	80±3°C , Dry t=240 hrs	1,2
Low Temperature Storage	-30±3°C ,Dry t=240 hrs	1,2
Thermal Shock Test	-20°C ~ 25°C ~ 70°C 30min.~ 5min.~ 30min. (1 cycle) Total 100 Cycle (Dry)	1,2
Humidity Test	60°C, Humidity 90%, 240 hrs	1,2
Vibration Test (Packing)	Sweep frequency : 10 ~ 55 ~ 10 Hz/1min Amplitude : 0.75mm Test direction : X.Y.Z/3 axis Duration : 30min/each axis	2

Note(1) Condensation of water is not permitted on the module.

Note(2) The module should be inspected after 1 hour storage in normal conditions (15-35°C, 45-65%RH).

Note(3) The module shouldn't be tested over one condition, and all the tests are independent.

Note(4) All reliability tests should be done without the protective film.

Definitions of life end point:

- Current drain should be smaller than the specific value.
- Function of the module should be maintained.
- Appearance and display quality should not have degraded noticeably.
- Contrast ratio should be greater than 50% of the initial value.

8.0 General Precaution

8.1 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.

8.2 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. AMPIRE does not warrant the module, if customers disassemble or modify the module.

8.3 Breakage of LCD Panel

(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.
(2) If liquid crystal contacts mouth or eyes, rinse out with water immediately.
(3) If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.
(4) Handle carefully with chips of glass that may cause injury, when the glass is broken.

8.4 Electric Shock

(1) Disconnect power supply before handling LCD module.
(2) Do not pull or fold the LED cable.
(3) Do not touch the parts inside LCD modules and the fluorescent LED's connector or cables in order to prevent electric shock.

8.5 Absolute Maximum Ratings and Power Protection Circuit

(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.
(2) Please do not leave LCD module in the environment of high humidity and high temperature for a long time.
(3) It's recommended to employ protection circuit for power supply.

8.6 Operation

(1) Do not touch, push or rub the polarizer with anything harder than HB pencil lead.
(2) Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.
(3) When the surface is dusty, please wipe gently with absorbent cotton or other soft material.
(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 cause deformation or color fading.
(5) When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzene or other adequate solvent.

8.7 Mechanism

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

8.8 Static Electricity

(1) Protection film must remove very slowly from the surface of LCD module to prevent from electrostatic occurrence.
(2) Because LCD modules 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.

8.9 Strong Light Exposure

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

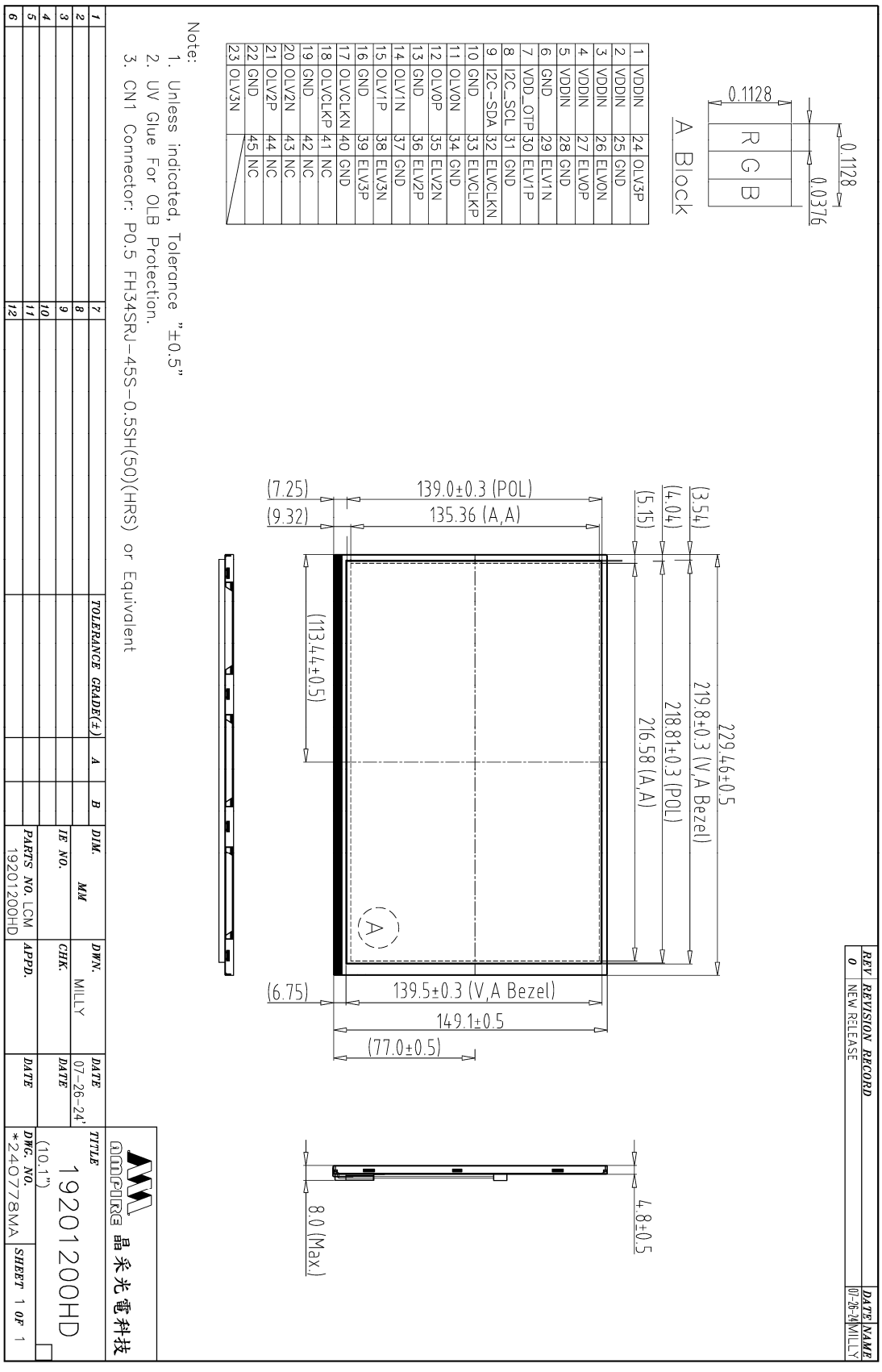
8.10 Disposal

When disposing LCD module, obey the local environmental regulations.

8.11 Others

Do not keep the LCD at the same display pattern continually. The residual image will happen and it will damage the LCD. Please use screen saver.

9.0 Outline Dimension



1	VDDIN	24	OLV3P									
2	VDDIN	25	GND									
3	VDDIN	26	ELVON									
4	VDDIN	27	ELVOP									
5	VDDIN	28	GND									
6	GND	29	ELV1N									
7	VDD_OTP	30	ELV1P									
8	I2C_SCL	31	GND									
9	I2C_SDA	32	ELVCLKN									
10	GND	33	ELVCLKP									
11	OLVON	34	GND									
12	OLVOP	35	ELV2N									
13	GND	36	ELV2P									
14	OLV1N	37	GND									
15	OLV1P	38	ELV3N									
16	GND	39	ELV3P									
17	OLVCLKN	40	GND									
18	OLVCLKP	41	NC									
19	GND	42	NC									
20	OLV2N	43	NC									
21	OLV2P	44	NC									
22	GND	45	NC									
23	OLV3N											

Note:
1. Unless indicated, Tolerance "±0.5"
2. UV Glue For OLB Protection.
3. CN1 Connector: P0.5 FH34SRJ-45S-0.5SH(50)(HRS) or Equivalent

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

TOLERANCE GRADE(±)	A	B

DIM.	MM
IE NO.	
PARTS NO.	LCM 1920120OHD

DWN.	CHK.	APPD.
MILLY		

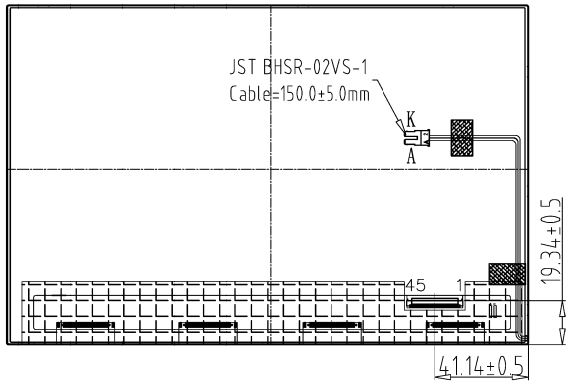
DATE	DATE	DATE
07-26-24'		

AMPIRE 晶采光電科技

TITTLE	DWG. NO.	SHEET
1920120OHD (10.1")	*2407784A	1 OF 1

REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	07-26-24	MILLY

1	VDDIN	24	OLV3P
2	VDDIN	25	GND
3	VDDIN	26	ELV0N
4	VDDIN	27	ELV0P
5	VDDIN	28	GND
6	GND	29	ELV1N
7	VDD_OTP	30	ELV1P
8	I2C_SCL	31	GND
9	I2C-SDA	32	ELVCLKN
10	GND	33	ELVCLKP
11	OLV0N	34	GND
12	OLV0P	35	ELV2N
13	GND	36	ELV2P
14	OLV1N	37	GND
15	OLV1P	38	ELV3N
16	GND	39	ELV3P
17	OLVCLKN	40	GND
18	OLVCLKP	41	NC
19	GND	42	NC
20	OLV2N	43	NC
21	OLV2P	44	NC
22	GND	45	NC
23	OLV3N		



Back View

Note:
1. Unless indicated, Tolerance "±0.5"
2. UV Glue For OLB Protection.
3. CN1 Connector: P0.5 FH34SRJ-45S-0.5SH(50)(HRS) or Equivalent

1		7		TOLERANCE GRADE(±)	A	B	DIM. MM	DWN. MILLY	DATE 07-26-24'	TITLE 19201200HD (10.1")
2		8					IE NO.	CHK.	DATE	
3		9								
4		10								
5		11					PARTS NO. LCM-19201200HD	APPD.	DATE	DWG. NO. *240779MA
6		12								SHEET 1 OF 1

晶采光電科技

10.0 Package

T.B.D.