



C O D I C O<sup>®</sup>

晶采光電科技股份有限公司  
AMPIRE CO., LTD.

## SPECIFICATIONS FOR LCD MODULE

<b>CUSTOMER</b>	
<b>CUSTOMER PART NO.</b>	
<b>AMPIRE PART NO.</b>	<b>AM-19201080M2TZQW-00</b>
<b>APPROVED BY</b>	
<b>DATE</b>	

Preliminary Specification

Formal Specification

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Approved by	Checked by	Organized by
Patrick	Lawlite	Kokai

This Specification is subject to change without notice.

## RECORD OF REVISION

Revision Date	Page	Contents	Editor
2020/10/05	--	New Release	Mantle
2021/7/29	4,16	● Modify Temperature range data.	Kokai
	3,19,20	● Update Outline dimension drawing	
	5	● Update the IDD PDD, Add VDDrp	
	7	● Update Back-light unit data.	
	11,13	● Update Optical Specifications	
	14	● Update LVDS connector pin1 diagram.	
	15	● Update LED driver Board drawing.	
2021/8/23	15	● Update LED driver Board Interface	Kokai

## 1.0 General Descriptions

### 1.1 Introduction

It's a 21.5 inch wide color TFT-LCD module, the display supports the Full HD-1920 X 1080 resolution and have 16.7M colors(RGB 8-bits).

### 1.2 Features

- 5V Logic Power
- LVDS (2ch) Interface for 1920 RGB x 1080 resolution
- 16.7M colors (RGB 8 bits)
- Green Product (RoHS)

### 1.3 Product Summary

Items	Specifications	Unit
Screen Diagonal	21.5	Inch
Active Area	476.64 (H) x268.11 (V)	mm
Pixel Format	1920 (H) x RGB x 1080 (V)	-
Pixel Pitch	0.24825 (H) X 0.24825 (V)	mm
Pixel Arrangement	R.G.B. Vertical Stripe	-
Display Mode	Normally Black	-
White Luminance	1000 (Typ)	cd /m2
Contrast Ratio	5000 : 1 (Typ)	-
Input Voltage	+5.0	V
Outline Dimensions	495.6x292.2Vx24.05	mm
Support Color	16.7M	-
Weight	1630(± 175)	g

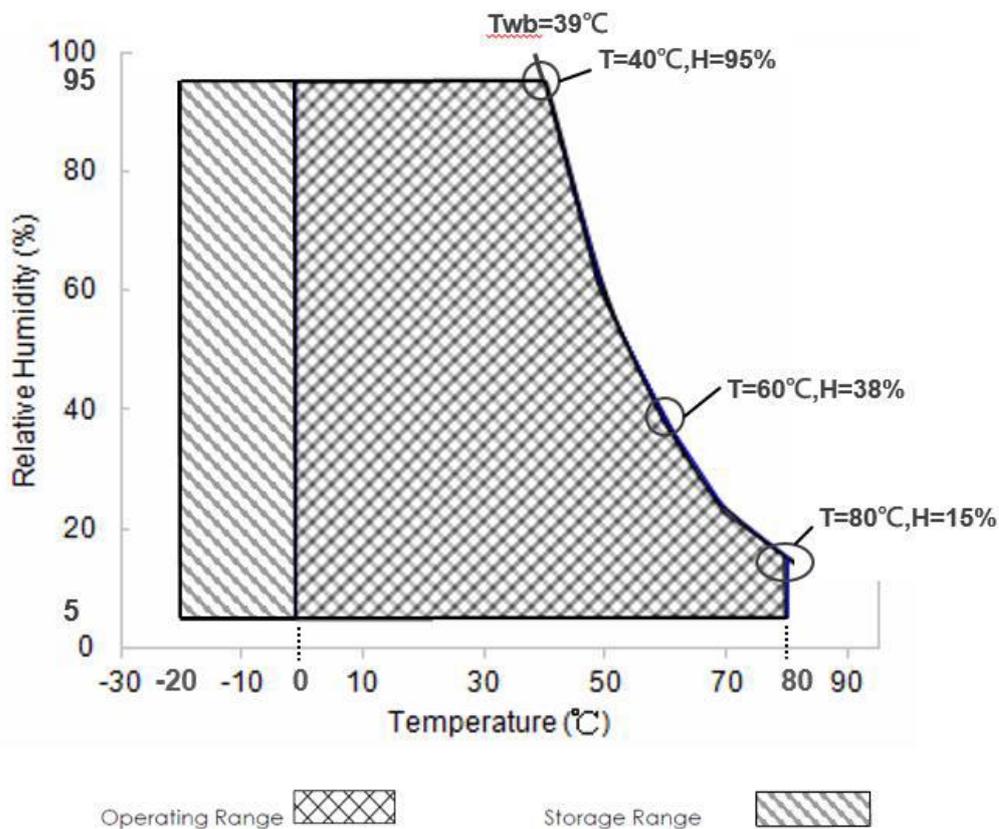
## 2.0 Absolute Maximum Ratings

ITEM	SYMBOL	VALUES		UNIT	REMARK
		MIN	MAX		
Logic / LCD Drive	VDD	0	5.5	V	
Operation Temperature	T <sub>op</sub>	0	80	°C	
Operation Humidity	H <sub>OP</sub>	5	90	%RH	
Storage Temperature	T <sub>st</sub>	-20	80	°C	
Storage Humidity	H <sub>ST</sub>	5	90	%RH	

Note 1: With in Ta (25°C)

Note 2: Permanent damage to the device may occur if exceeding maximum values

Note 3: Operation Temperature + 80°C is defined as panel surface temperature.



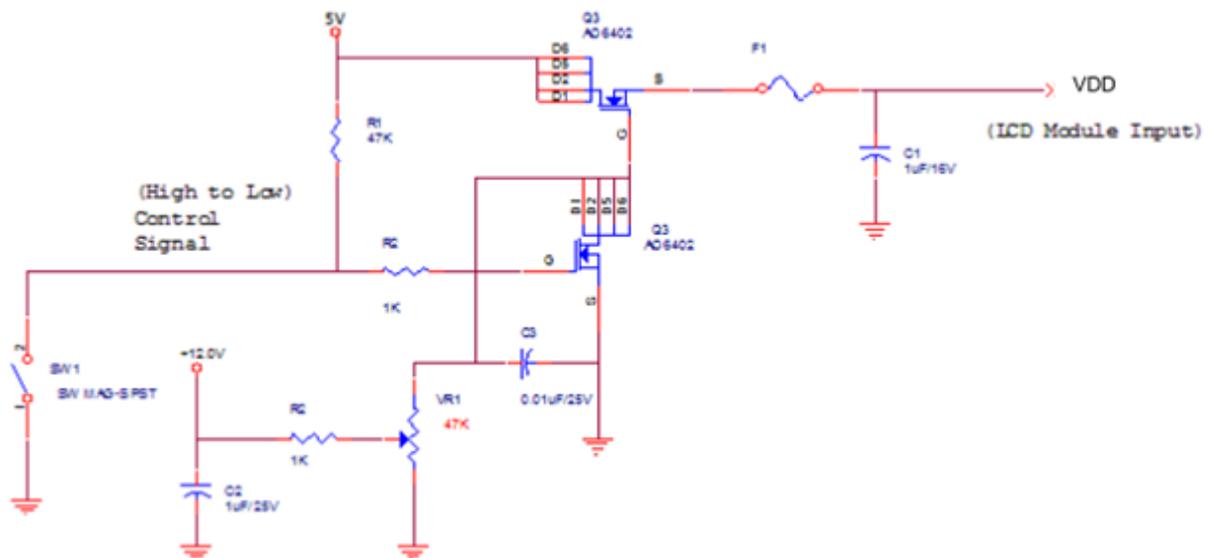
### 3.0 ELECTRICAL SPECIFICATIONS

#### 3.1 LCD ELECTRONICS SPECIFICATION

Parameter	Symbol	Value			Unit	Note
		Min	Typ.	Max.		
Power Supply Voltage	VDD	4.5	5.0	5.5	V	-
Rush Current	IRUSH	-	-	3	A	(2)
VDD Current	IDD	-	0.7	0.8	A	(3)
VDD Current	IDD	-	0.81	0.89	A	(4)
VDD Power	PDD	-	3.5	4.4	Watt	(3)
VDD Power	PDD	-	4.05	4.9	Watt	(4)
Allowable Logic/LCD Drive Ripple Voltage	VDDrp	-	-	500	[mV]p-p	(4)

Note(1) The ambient temperature is  $T_a = 25 \pm 2^\circ\text{C}$

Note(2) Measurement Conditions:



Note(3) VDD= 5.0V, All white pattern, At 60Hz

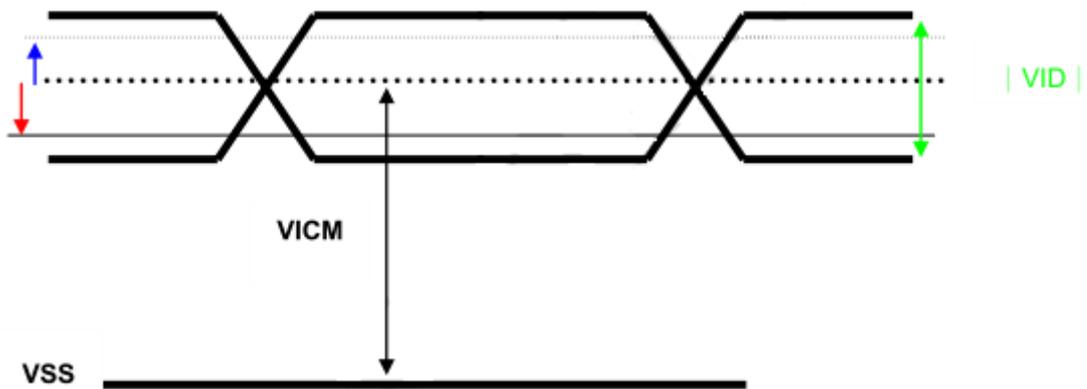
Note(4) VDD= 5.0V, All white pattern, At 75Hz

### 3.2 Signal Electrical Characteristics

Input signals shall be low or Hi-Z state when VDD is off.

Symbol	Item	Min.	Typ.	Max.	Unit	Remark
VTH	Differential Input High Threshold	-	-	+100	mV	VCM=1.2V
VTL	Differential Input Low Threshold	-100	-	-	mV	VCM=1.2V
VID	Input Differential Voltage	100	-	600	mV	
VICM	Differential Input Common mode Voltage	+1.0	+1.2	+1.5	V	VTH/VTL=±100mV

**Note: LVDS Signal waveform.**



### 3.3 Backlight Unit

Symbol	Item	Min.	Typ.	Max.	Unit	Remark
VLED	Input Voltage	10.8	12	13.2	Volt	
ILED	Input Current	-	3.42		A	100% Dimming
PLED	Power Consumption	-	41.04		wat	100% Dimming
Irush	Inrush Current	-	-	4	A	
Backlight on/off	on control voltage	2.0	-	5.5	V	
	off control voltage	0	-	0.8	V	
Backlight Dimming (PWM dimming)	PWM Dimming	90	180	240	Hz	
	High Voltage	2.0	-	3.3	V	
	Low Voltage	0	-	0.8	V	
	Dimming Duty Cycle	.	-	100	%	
If	LED Forward Current		50		mA	Ta=25°C
Life time		50,000	-	-	Hrs	Ta=25°C

Note 1: Ta means ambient temperature of TFT-LCD module.

Note 2: If TFT-LCD module is driven at high ambient temperature & Humidity condition.

Theoperating life will be reduced.

Note 3: Definition of life time: Brightness becomes to 50% of its original value. The minimum life time of LED unit is on the condition of IF = 50 mA and 25°C (Room Temperature).

Note 4: LED light bar structure: (2 Light bar x 4 strings x 20pcs / string =160pcs LED)

## 4. Interface Timings

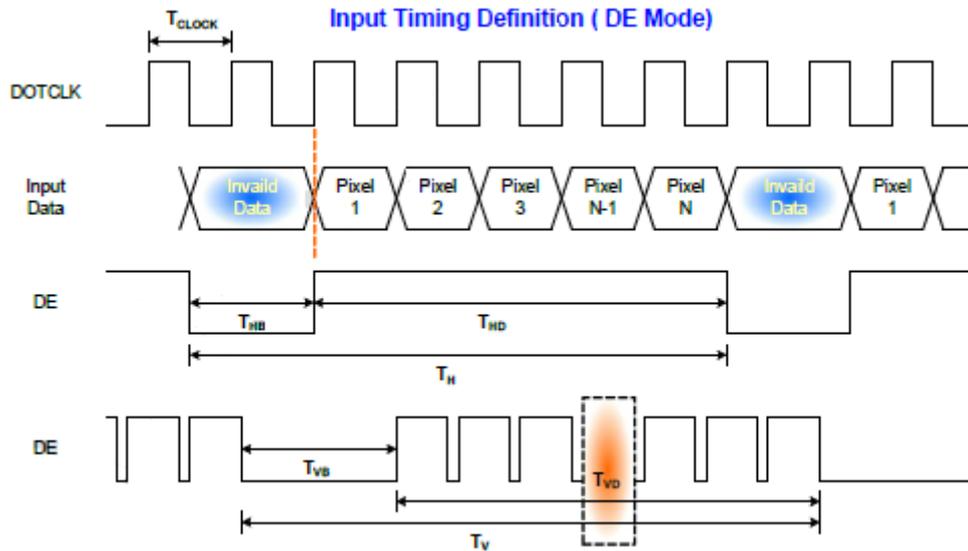
### 4.1 Timing Characteristics

Signal	Parameter	Symbol	Min.	Typ.	Max.	Unit	
Clock Timing	Clock frequency	1/Tclock	40	72	83	Mhz	
Vsync timing	Vertical section	Period	Tv	1092	1130	1653	Tline
		Active	Tvd	1080	1080	1080	
		Blanking	Tvb	12	50	573	
Hsync Timing	Horizontal Section	Period	Th	1004	1050	1100	Tclock
		Active	Thd	960	960	960	
		Blanking	Thb	44	90	140	
Frame Rate		F	50	60	75	Hz	

Note 1: DE mode only.

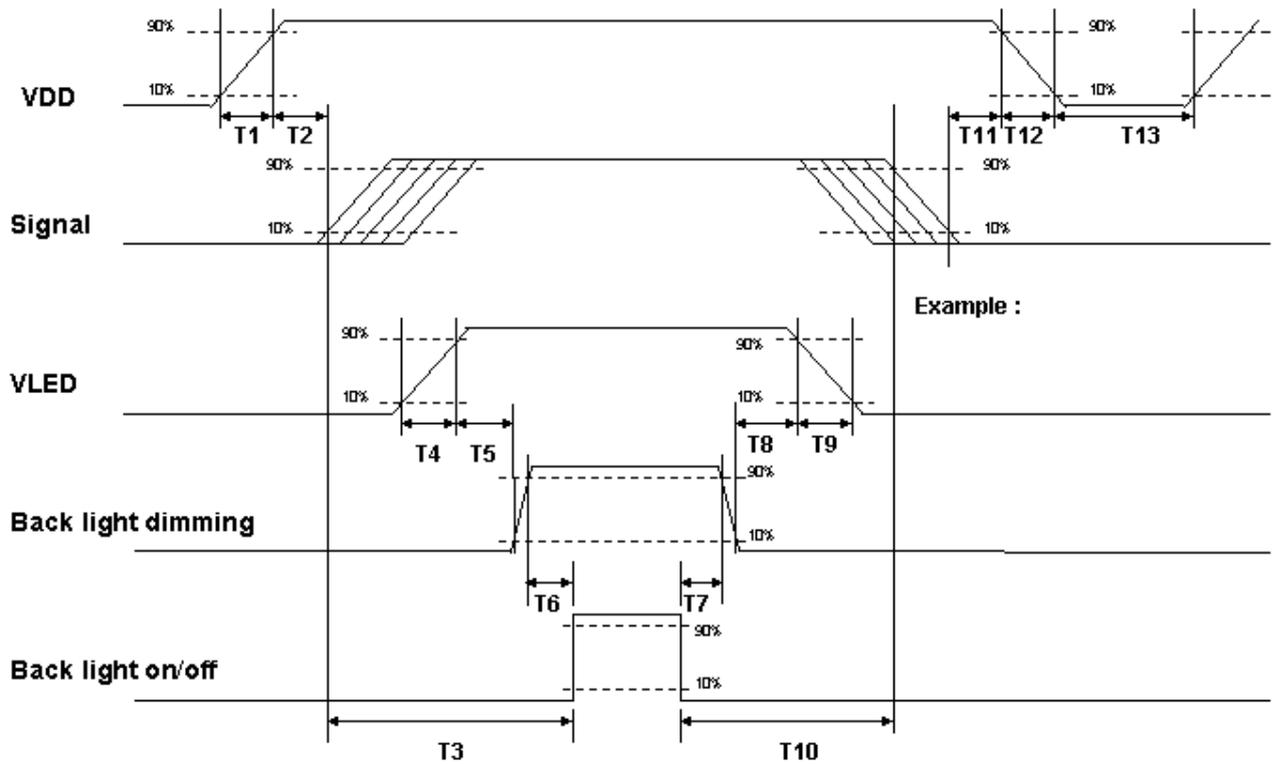
Note 2: Typical value refer to VESA STANDARD

### 4.2 Input Timing Diagram



### 4.3 POWER ON/OFF SEQUENCE

The power swquence specifications are shown as the following table and diagram.

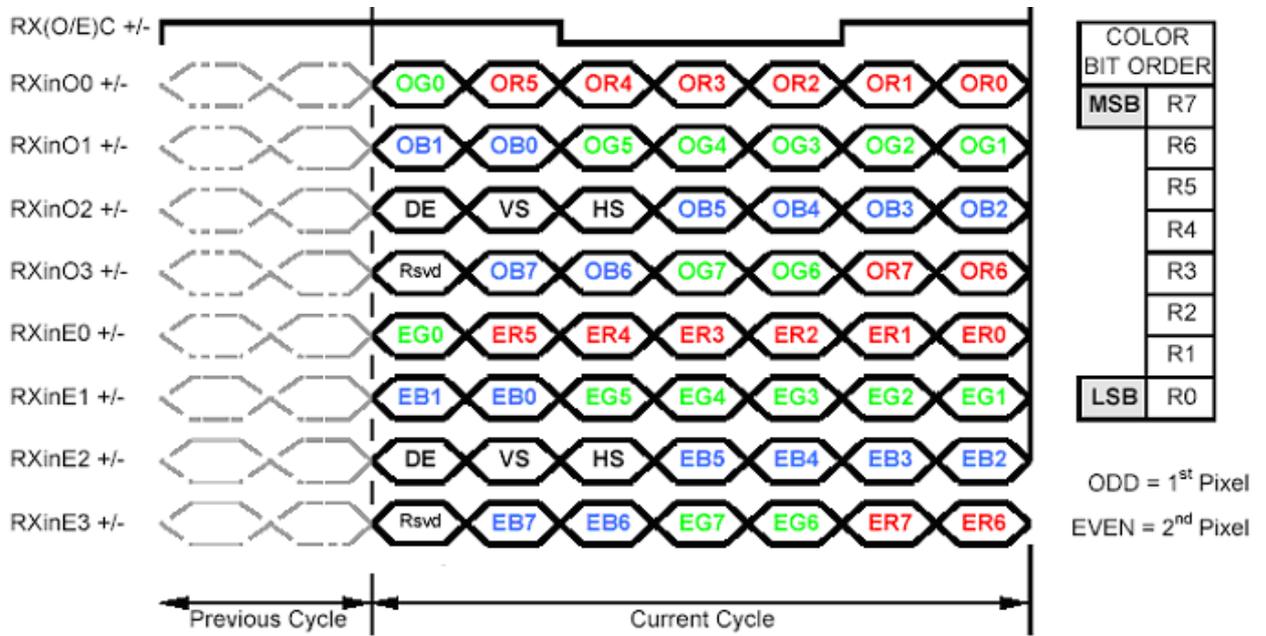


#### Timing Specifications:

Parameter	Value			Units
	Min.	Typ.	Max.	
T1	0.5	–	10	[ms]
T2	30	40	50	[ms]
T3	200	–	–	[ms]
T4	0.5	–	10	[ms]
T5	10	–	–	[ms]
T6	10	–	–	[ms]
T7	0	–	–	[ms]
T8	10	–	–	[ms]
T9	–	–	10	[ms]
T10	110	–	–	[ms]
T11	0	16	50	[ms]
T12	–	–	10	[ms]
T13	1000	–	–	[ms]

The above on/off sequence should be applied to avoid abnormal function in the display. Please make sure to turn off the power when you plug the cable into the input connector or pull the cable out of the connector.

#### 4.4 The Input Data Format

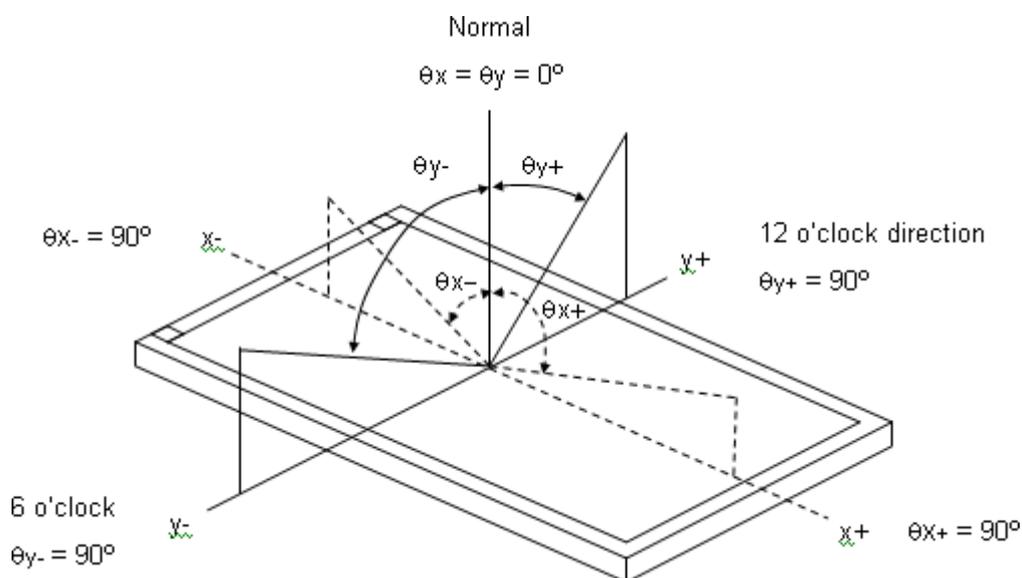


## 5. Optical Specifications

The optical characteristics are measured under stable conditions as following notes

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note	
Color Chromaticity (CIE 1931)	Red	Rx	$\theta_x=0^\circ, \theta_y=0^\circ$ CS-2000 R=G=B=255 Gray scale	Typ - 0.05	0.639	Typ + 0.05	-	(1), (4)
		Ry			0.334			
	Green	Gx			0.324			
		Gy			0.613			
	Blue	Bx			0.153			
		By			0.062			
	White	Wx			0.313			
		Wy			0.329			
Center Luminance of White	$L_C$		800	1000	-	cd/m <sup>2</sup>	(4)	
Contrast Ratio	CR		3000	5000	-	-	(2), (4)	
Response Time	$T_R$	$\theta_x=0^\circ, \theta_y=0^\circ$	-	20	25	ms	(3)	
	$T_F$		-	5	10			
Cross Talk(in 60Hz)	CT		-	-	1.5	%	(6)	
Color Gamut	CG		-	72		%		
Uniformity		9 points	75	80		%	(4) (5)	
Viewing Angle	Horizontal	$\theta_{x+}$	$CR \geq 10$	75	89	---	Deg.	(1), (4)
		$\theta_{x-}$		75	89			
	Vertical	$\theta_{y+}$		75	89			
		$\theta_{y-}$		75	89	---		

Note (1) Definition of Viewing Angle ( $\theta_x, \theta_y$ ):

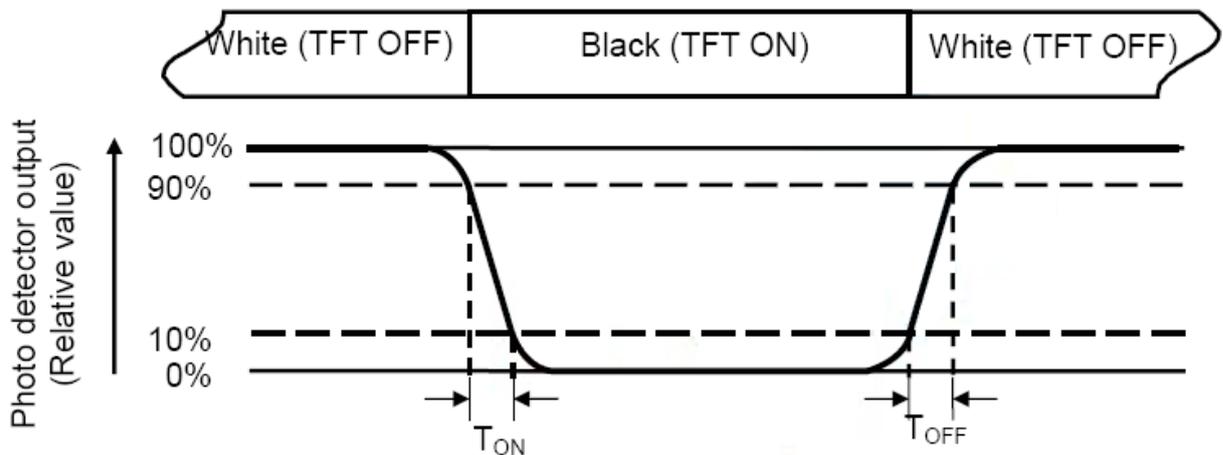


Note (2) Definition of Contrast Ratio (CR):

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

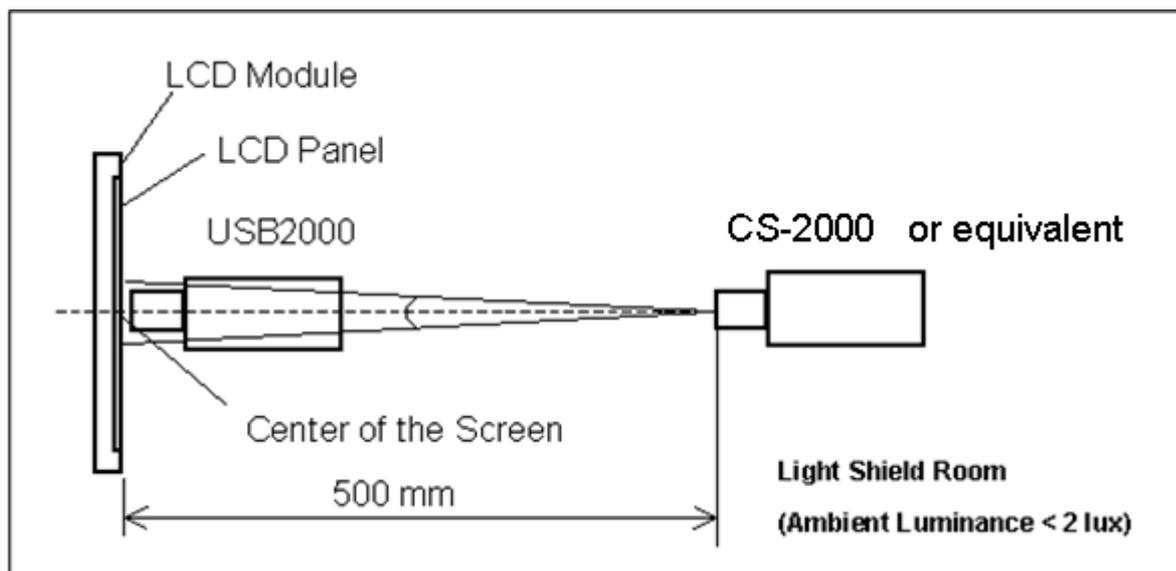
Note (3) Definition of Response Time:

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time ( $T_{ON}$ ) is the time between photo detector output intensity changed from 90% to 10%. And fall time ( $T_{OFF}$ ) is the time between photo detector output intensity changed from 10% to 90%.

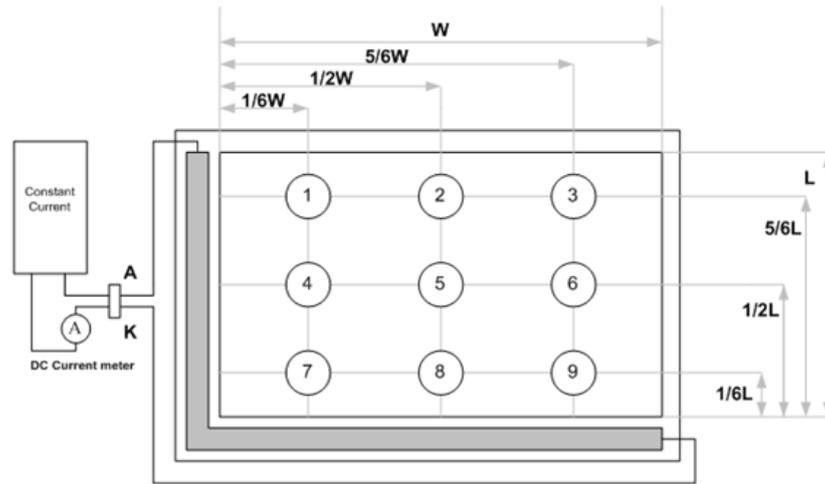


Note (4) Definition of optical measurement system.:

The LCD module should be stabilized at given temperature for 30 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30 minutes in a windless room.



Note (5) Definition of Luminance Uniformity



$$\delta_{w9} = \frac{\text{Minimum Brightness of nine points}}{\text{Maximum Brightness of nine points}}$$

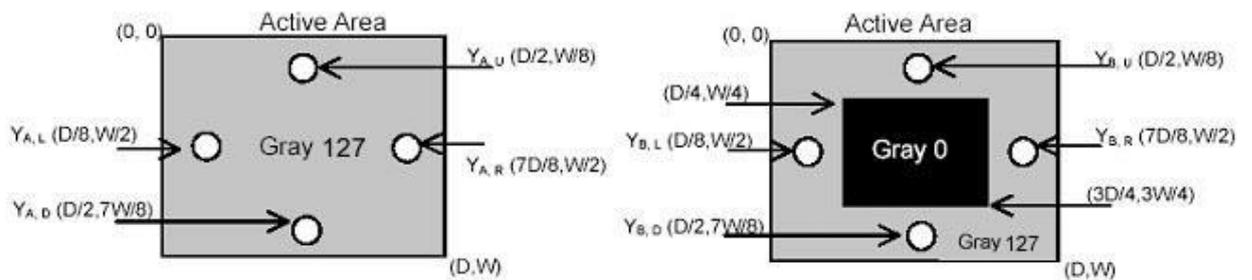
Note (6) Definition of Cross talk

$$CT = | Y_B - Y_A | / Y_A \times 100 (\%)$$

Where

Y<sub>A</sub> = Luminance of measured location without gray level 0 pattern (cd/m<sup>2</sup>)

Y<sub>B</sub> = Luminance of measured location with gray level 0 pattern (cd/m<sup>2</sup>)

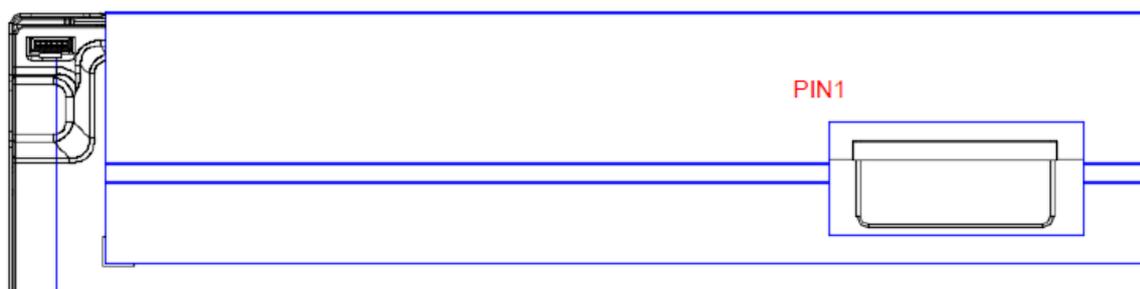


## 6. Interface Connections

### 6.1 LVDS

Connector Name /Designation	Signal Connector
Manufacturer	JAE or compatible
Connector Model Number	JAE(FI-XB30SRL-HF11) or equivalent
Mating Housing Part Number	FI-X30HL(JAE) or compatible

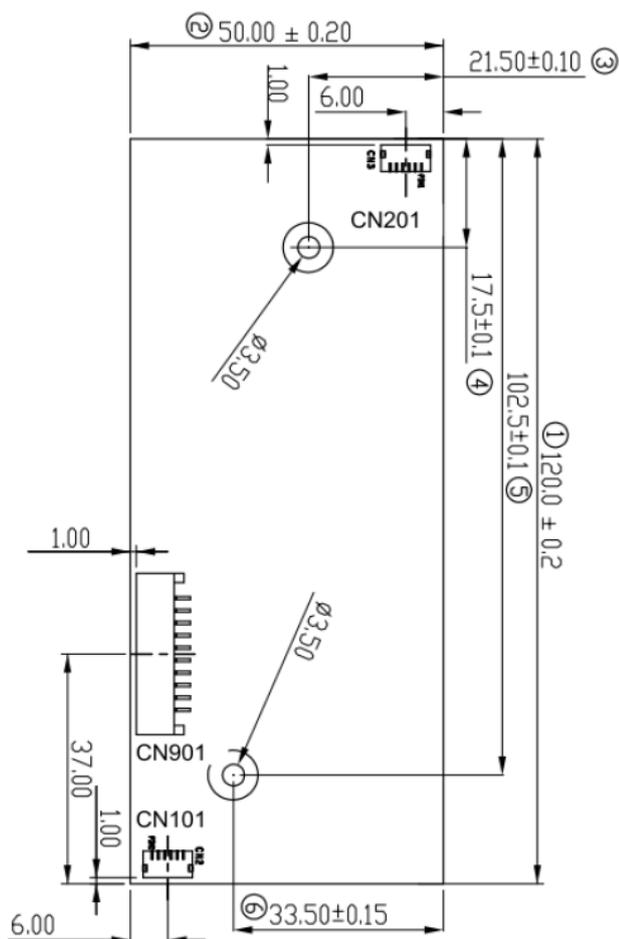
Pin	Name	Description
1	RXinO0-	Negative LVDS differential data input(Odd data)
2	RXinO0+	Positive LVDS differential data input( Odd data)
3	RXinO1-	Negative LVDS differential data input(Odd data)
4	RXinO1+	Positive LVDS differential data input( Odd data)
5	RXinO2-	Negative LVDS differential data input(Odd data,H-Sync, V-Sync, DSPTMG)
6	RXinO2+	Positive LVDS differential data input( Odd data,H-Sync, V-Sync, DSPTMG)
7	GND	Power Ground
8	RXOCLKIN-	Negative LVDS differential data input(Odd clock)
9	RXOCLKIN+	Positive LVDS differential data input( Odd clock)
10	RXinO3-	Negative LVDS differential data input(Odd data)
11	RXinO3+	Positive LVDS differential data input( Odd data)
12	RXinE0-	Negative LVDS differential data input(Even data)
13	RXinE0+	Positive LVDS differential data input(Even data)
14	GND	Power Ground
15	RXinE1-	Negative LVDS differential data input(Even data)
16	RXinE1+	Positive LVDS differential data input(Even data)
17	GND	Power Ground
18	RXinE2-	Negative LVDS differential data input(Even data)
19	RXinE2+	Positive LVDS differential data input(Even data)
20	RxECLKIN-	Negative LVDS differential data input(Even clock)
21	RxECLKIN+	Positive LVDS differential data input(Even clock)
22	RXinE3-	Negative LVDS differential data input(Even data)
23	RXinE3+	Positive LVDS differential data input(Even data)
24	GND	Power Ground
25	NC	No connect
26	NC	No connect
27	NC	No connect
28	VDD	Power 5V
29	VDD	Power 5V
30	VDD	Power 5V



## 6.2 LED

<b>Connector Name /Designation</b>	<b>Signal Connector</b>
<b>Manufacturer</b>	<b>CVILUX</b>
<b>Connector Model Number</b>	<b>CI0110M1HRO-NH or equivalent</b>

CN901		
Pin	Name	Description
1	VLED	12V
2	VLED	12V
3	VLED	12V
4	VLED	12V
5	GND	Ground
6	GND	Ground
7	GND	Ground
8	GND	Ground
9	Backlight on\off	BL ON/OFF Enable
10	Backlight dimming	3.3V PWM Control



## 7. Reliability Test

The reliability test items and its conditions are shown below.

Test Item	Test Conditions	Note
High Temperature Operation	80±3°C , t=240 hrs	
Low Temperature Operation	0±3°C , t=240 hrs	
High Temperature Storage	80±3°C , t=240 hrs	1,2
Low Temperature Storage	-20±3°C , t=240 hrs	1,2
Storage at High Temperature and Humidity	50°C, 80% RH , 240 hrs	1,2
Thermal Shock Test	-20°C (30min) ~ 80°C (30min) , 100 cycles	1,2
Shock (Non-Operating)	Acceleration: 50 G Wave: Half-sine Active Time: 20 ms Direction: ±X, ±Y, ±Z (one time for each Axis)	
Vibration (Non-Operating)	Acceleration: 1.5 Grms Wave: Random Frequency: 10 - 200 Hz Duration: 30 Minutes each Axis (X, Y, Z)	

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 more than one condition, and all the test conditions are independent.

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

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 . 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.

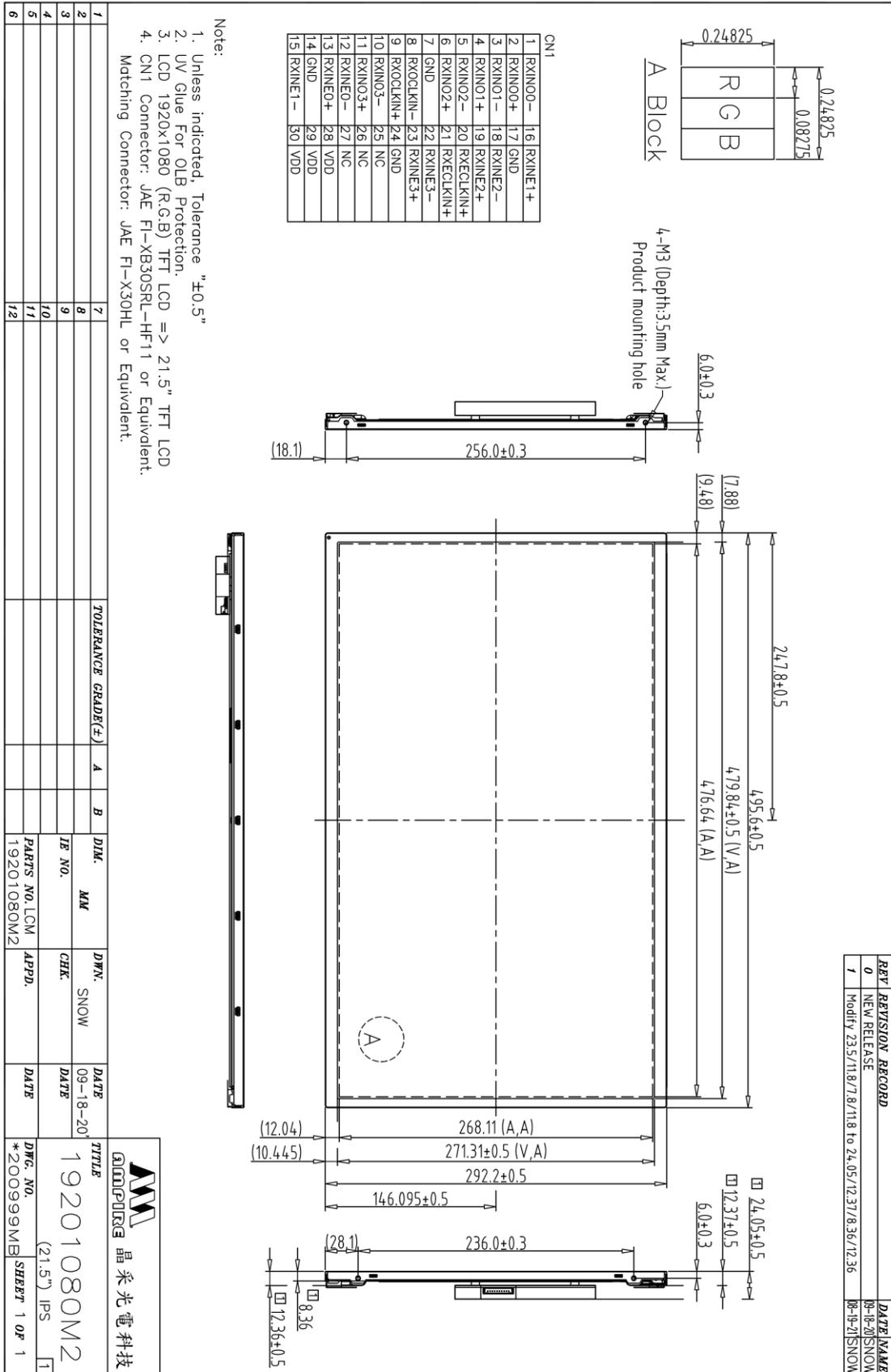
## **8.10 Disposal**

When disposing LCD module, obey the local environmental regulations.

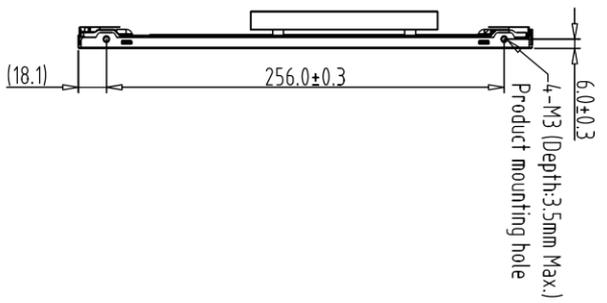
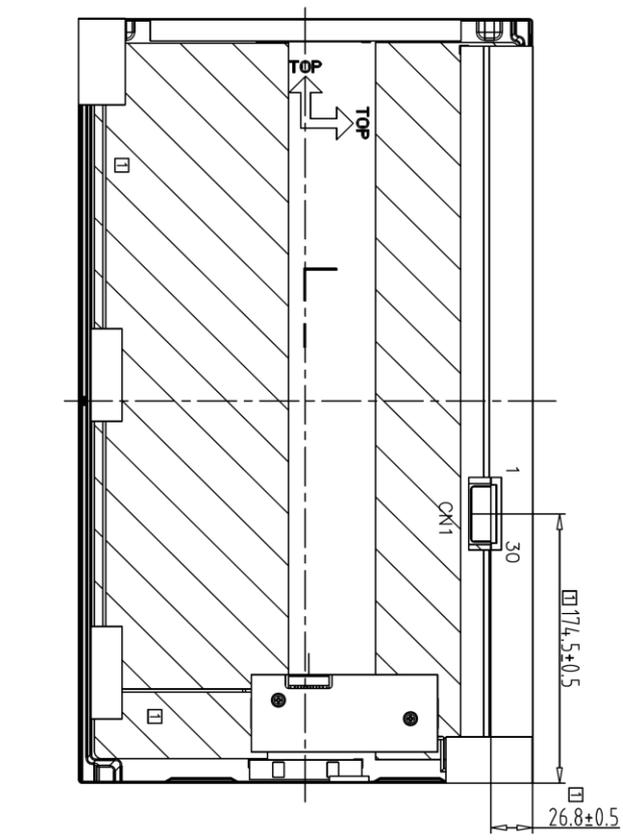
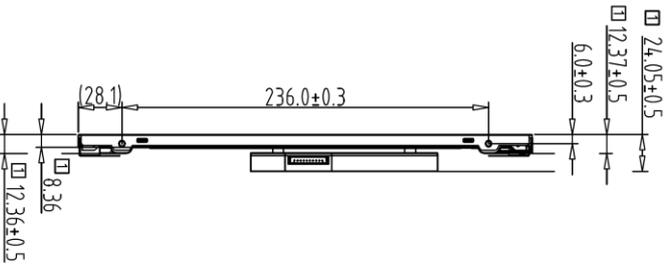
## **8.11 Others**

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. Outline Dimension



REV	REVISION RECORD	DATE NAME
0	NEW RELEASE	09-18-2018 SNOW
1	Modify 235/118/718/118/12/27/26 to 246/5/123/136/12/36/11.5/26.8	08-19-21 SNOW



CN1	
1	RXIN00-
2	RXIN00+
3	RXIN01-
4	RXIN01+
5	RXIN02-
6	RXIN02+
7	GND
8	RXOCLKIN-
9	RXOCLKIN+
10	RXIN03-
11	RXIN03+
12	RXIN04-
13	RXIN04+
14	GND
15	RXIN05-
16	RXIN05+
17	GND
18	RXIN06-
19	RXIN06+
20	RXOCLKIN+
21	RXOCLKIN+
22	RXIN07-
23	RXIN07+
24	GND
25	NC
26	NC
27	NC
28	VDD
29	VDD
30	VDD

Note:

1. Unless indicated, Tolerance "±0.5"
2. UV Glue For OLB Protection.
3. LCD 1920x1080 (R:G:B) TFT LCD => 21.5" TFT LCD
4. CN1 Connector: JAE FI-XB30SRL-HF11 or Equivalent.  
Matching Connector: JAE FI-X30HL or Equivalent.

Back view

NO.	REV.	DATE	BY	CHK.	APP.	TITLE
1	7					
2	8	09-18-20				19201080M2
3	9					(21.5") IPS
4	10					
5	11					
6	12					


**晶采光電科技**  
 DWG. NO. \*2009100MB  
 SHEET 1 OF 1