Product Specification

Model Name	KD104QX06HA
Description	1024(RGB)x768 Dots 10.4" TFT LCD
Date	2023/7/19
Revision	1.0

Approved by/Date	**Check by/Date**	**Prepared by/Date**
LXM 2023/7/19	HZX 2023/7/19	ZWF 2023/7/19

Customer Approval	
Date	

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1. Record of Revision

Rev	Issued Date	Description	Editor
1.0	2023/7/19	First Release.	LXM

2 General Specifications

Feature		Spec
Characteristics	Size	10.4 inch
	Resolution	1024(Horizontal)*768(Vertical)
	Display Type	Transmissive, a-Si
	Interface	LVDS
	Color Numbers	256K/16.7M
	Color Arrangement	RGB Stripe
	Pixel pitch (mm)	0.2055 (H)×0.2055 (V)
	Pixel Configuration	R.G.B. Vertical Stripe
	Response Time (ms)	≤35
	Panel power consumption	Max:1.4W @white pattern
	Viewing Direction	CR≧10 @ R/L/U/D(80°/80°/80°/80°) (Min.)
Mechanical	LCM (W x H x D) (mm)	238.6 (H) x 175.8 (V) x 7.75 (D)
	Active Area(mm)	210.43 (H) x 157.82 (V)
	With /Without TP	Without TP
	Weight (g)	TBD
	LED Numbers	32 LEDs

Note 1: Requirements on Environmental Protection: RoHS
Note 2: LCM weight tolerance: +/- 5%

3 Input/Output Terminals

3.1 PIN assignment

Connector 1: Input LVDS CONN,30pins, P-two ,187098-30091.

A 30pin connector of P-two 187098-30091 is used for the module electronics interface.
And a special plug needed for connecting this connector, the recommended model is P-two 187130-30xx or JAE FI-X30H.

No.	Symbol	Description
1	NC	Reserved as BIST function for INX test
2	GND	Ground
3	Rin3+	Positive LVDS differential data input (+)
4	Rin3-	Negative LVDS differential data input (-)
5	GND	Ground
6	CLK+	Positive LVDS differential data input (+)
7	CLK-	Negative LVDS differential data input (-)
8	GND	Ground
9	Rin2+	Positive LVDS differential data input (+)
10	Rin2-	Negative LVDS differential data input (-)
11	GND	Ground
12	Rin1+	Positive LVDS differential data input (+)
13	Rin1-	Negative LVDS differential data input (-)
14	GND	Ground
15	Rin0+	Positive LVDS differential data input (+)
16	Rin0-	Negative LVDS differential data input (-)
17	GND	Ground
18	NC	No Connection
19	GND	Ground
20	SEL6/8	Selection for 6 bits/8bit LVDS data input Low or NC : 8 bit input mode High : 6 bit input mode
21	NC	Reversed as EE_WP for OTP function
22	NC	Reversed as EE_SDA for OTP function
23	NC	Reversed as EE_SCL for OTP function
24	Reverse	Reverse panel function (Display rotation)
25	GND	Ground
26	GND	Ground
27	GND	Ground
28	VDD	Power supply: + 3.3V
29	VDD	Power supply: + 3.3V
30	VDD	Power supply: + 3.3V

Note:
1. Pin1 is reversed as BIST function for test, don't connect signal to this pin, keep floating.
2. SEL6/8 is used for selecting 6bit/8bit LVDS data input, L or NC: 8bit; High:6bit.
3. Pin21,22,23 are used as SPI interface for OTP function, don't connect any signal to these pin, and don't short them, keep floating.
4. Reverse pin is used for selecting scanning direction.

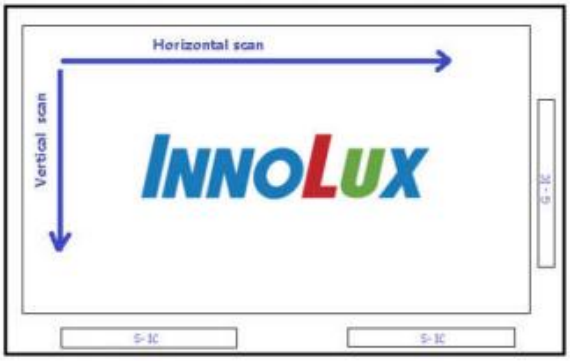


Fig. 1 Normal scan (Pin24, Reverse = Low or NC)

Fig. 2 Reverse scan (Pin24, Reverse = High)

3.2 Connector 2: Cillux,CI4205M2HRD-NH

5-pin connector is used for input power & control signals for BL converter power IC.

No	Symbol	I/O	Function	Remark
1	LED_VCCS	P	12V input	
2	LED_VCCS	P	12V input	
3	GND	P	Ground	
4	LED_PWM	I	PWM	
5	LED_EN	I	Converter power IC Enable (Active High)	

3.3 Connector3: Output BL power CONN, 3pins, Cillux,CI4203M2HRD-NH

3-pin connector is used for output power to BL module.

No	Symbol	I/O	Function	Remark
1	LED+	P	Red wire	BL output power
2	LED1-	P	White wire	BL feedback channel1
3	LED2-	P	White wire	BL feedback channel2

4 Absolute Maximum Ratings

Item	Symbol	MIN	MAX	Unit
Power Supply Voltage	VDD	-0.3	3.8	V
	LED_VCCS	-0.3	25	V
Operating Temperature	TOPR	-20	70	℃
Storage Temperature	TSTG	-20	70	℃

Note:

(1) All of the voltages listed above are with respective to GND= 0V

(2) Device is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above.

5 Electrical Characteristics

5.1 Parameter

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	VDD	3.0	3.3	3.6	V	
	LED_VCCS	11	12	13	V	
Input logic high voltage	V_{IH}	0.7VDD	-	VDD	V	1
Input logic low voltage	V_{IL}	0	-	0.3VDD	V	
Current for Power	I_{VDD}		385	424	mA	VDD =3.3V@frame 60 Hz, White pattern
	I_{LED_VCCS}	-	0.52	-	A	100% PWM Duty @ VLED+ =33V, ILED=80mA*2
LED_EN Control Level	BL On	3.0	-	5	V	
	BL Off	0	-	0.3	V	
LED_PWM Control Level	PWM High Level	3.0	-	5	V	
	PWM Low Level	0	-	0.3	V	
LED_PWM Control Frequency	f_{PWM}	1K	-	20K	Hz	2

Note 1: Including signal: SEL6/8 & Reverse
Note 2: LED_PWM duty >10%.

5.2 Backlight Characteristics

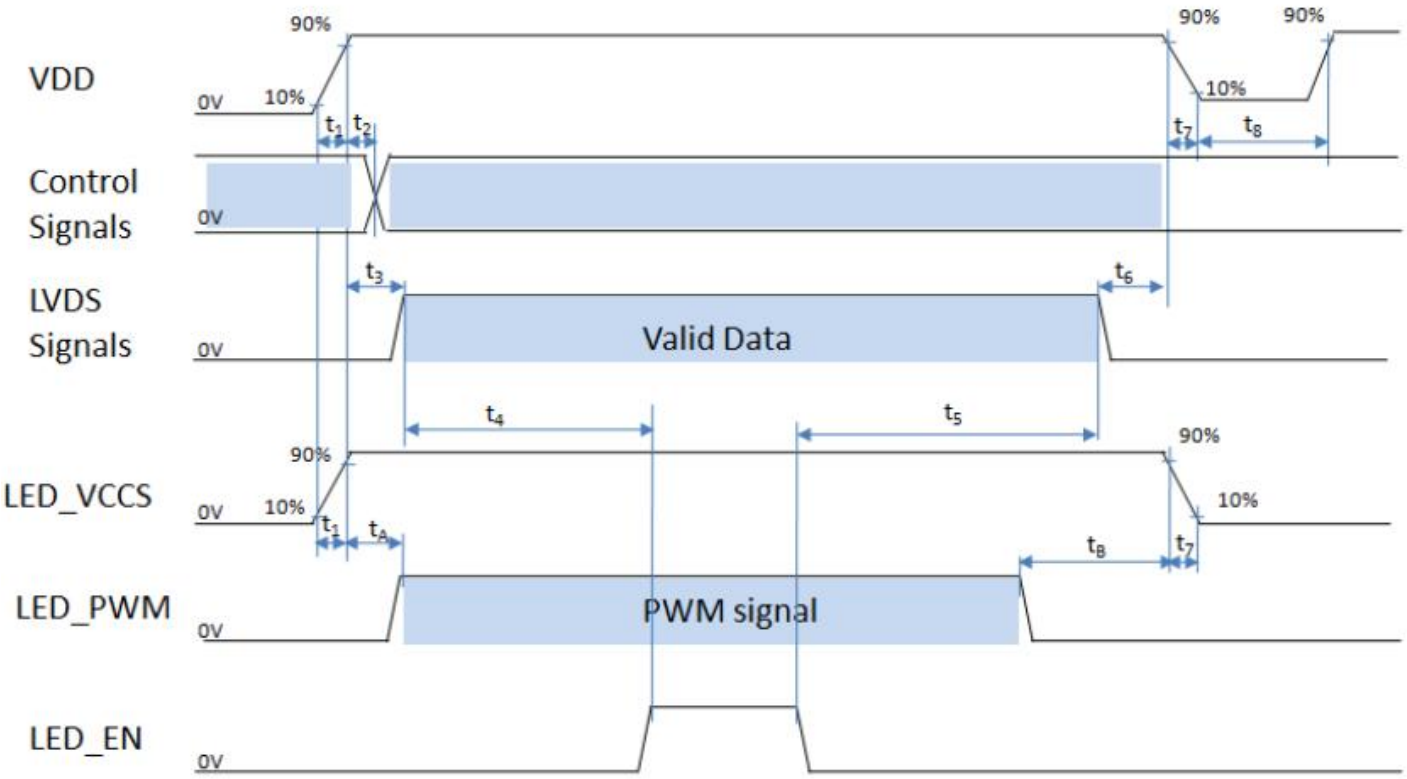
Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Voltage	V_F	21.6	-	26.5	V	If=160mA
Number of LED	-	-	32	-	Piece	-
Connection mode	8S4P	-	-	-	-	-

Using condition: constant current driving method If=160mA(+/-10%).

5.3 POWER SEQUENCE

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

Symbol	Value		Unit
	Min.	Max.	
t_1	1	20	ms
t_2	1	5	ms
t_3	10	50	ms
t_4	200	500	ms
t_5	200	500	ms
t_6	50	200	ms
t_7	0	20	ms
t_8	500	-	ms
t_A	0	50	ms
t_B	0	50	ms



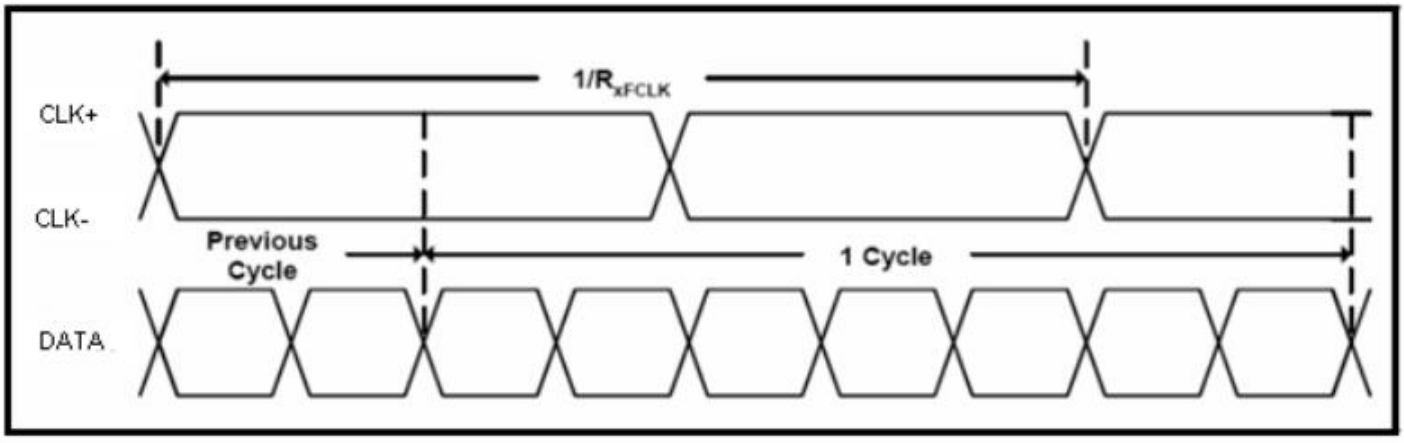
Note 1: Please don't plug the interface cable of on when system is turned on.
Note 2: Please avoid floating state of the interface signal during signal invalid period.
Note 3: It is recommended that the backlight power must be turned on after the power supply for LCD and the interface signal is valid.
Note 4: Control signals include SEL6/8 & Reverse.

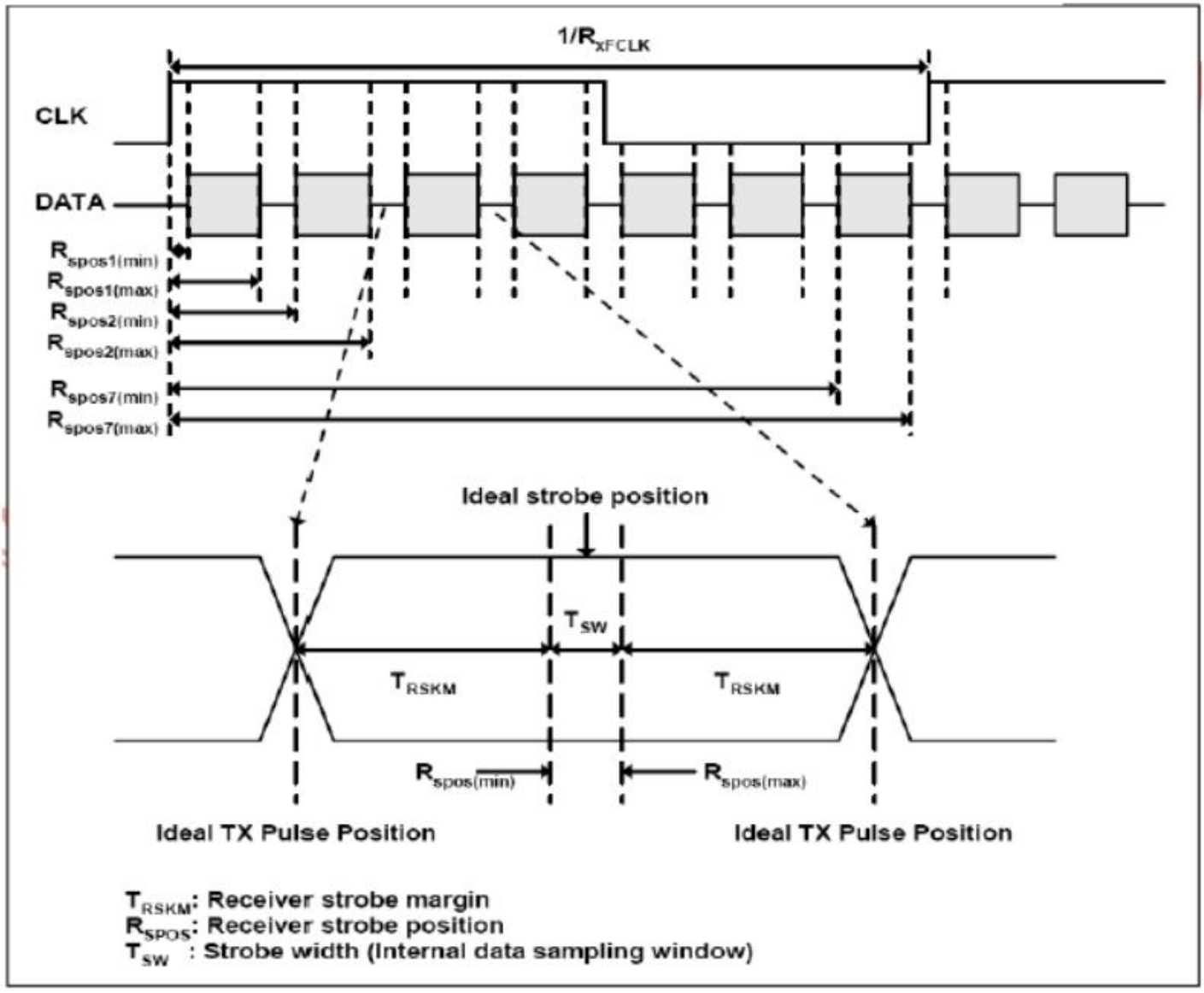
5.4 LVDS SIGNAL TIMING CHARACTERISTICS

5.4.1 AC Electrical characteristics

Parameter	Symbol	Min	Typ	Max	Units	Condition
Clock frequency	RxFCLK	26.2	51.2	71	MHz	
Input data skew margin	TRSKM	500	500	1/(2*RxFCLK)	ps	Typical value for 1024*600 resolution
Clock high time	TLVCH		4/(7xRxFCLK)		ns	|VID|=400mv RxVCM=1.2V RxFCLK=71MHz VDD_LVDS=3.3V
Clock low time	TLVCL		3/(7xRxFCLK)		ns	
VSD setup time	TenPLL	0	TenPLL	150	us	

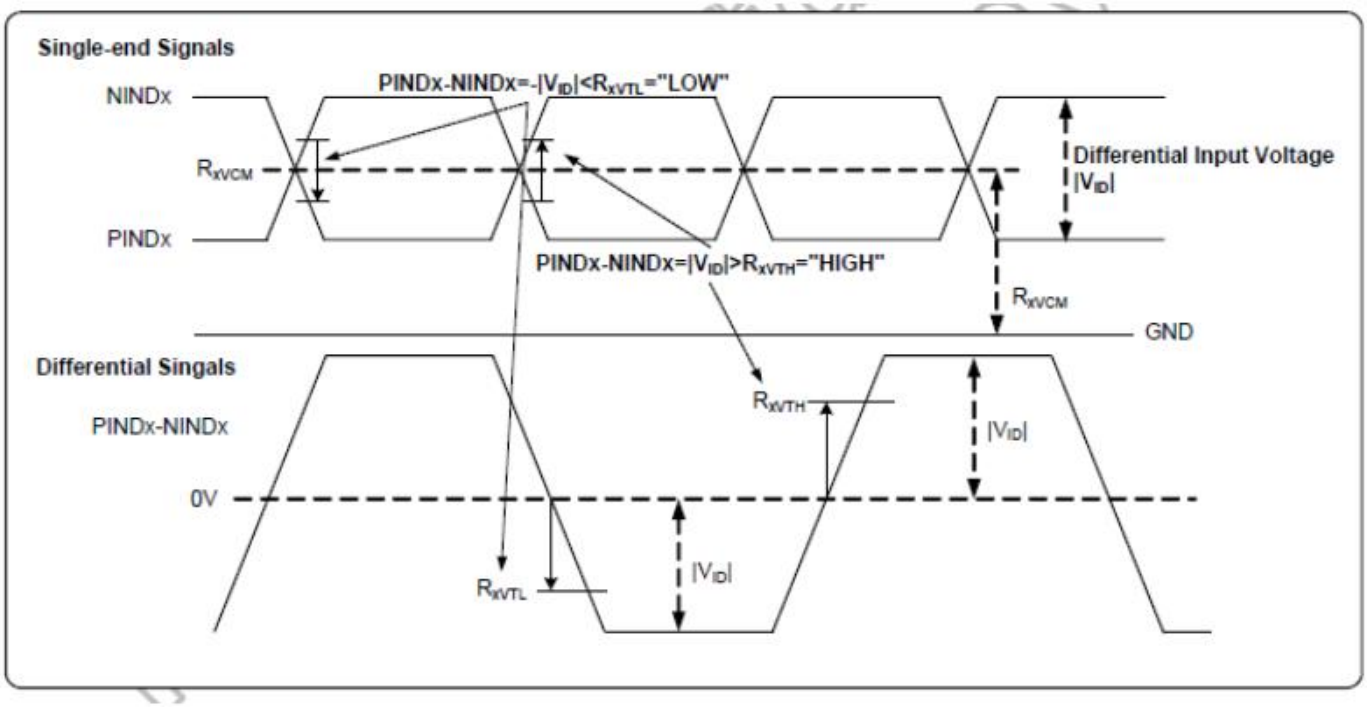
5.4.2 Input clock and data timing diagram




1/RxFCLK
CLK
DATA
Rspos1(min)
Rspos1(max)
Rspos2(min)
Rspos2(max)
Rspos7(min)
Rspos7(max)
Ideal strobe position
Tsw
TRSKM
TRSKM
Rspos(min)
Rspos(max)
Ideal TX Pulse Position
Ideal TX Pulse Position
TRSKM: Receiver strobe margin
RSPOS: Receiver strobe position
Tsw : Strobe width (Internal data sampling window)

5.4.3 DC electrical characteristics

Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
LVDS Differential input high Threshold voltage	R_{xVTH}	-	-	+100	mV	R_{XVCM}=1.2V
LVDS Differential input low Threshold voltage	R_{xVTL}	-100	-	-	mV	
Input Voltage range (Singled-end)	R_{xVIN}	0	-	VDD-1.2+ $\|V_{ID}\|/2$	V	
LVDS Differential input common mode voltage	R_{xVCM}	$\|V_{ID}\|/2$	-	VDD-1.2	V	
LVDS Differential voltage	$\|V_{ID}\|$	0.2	-	0.6	V	

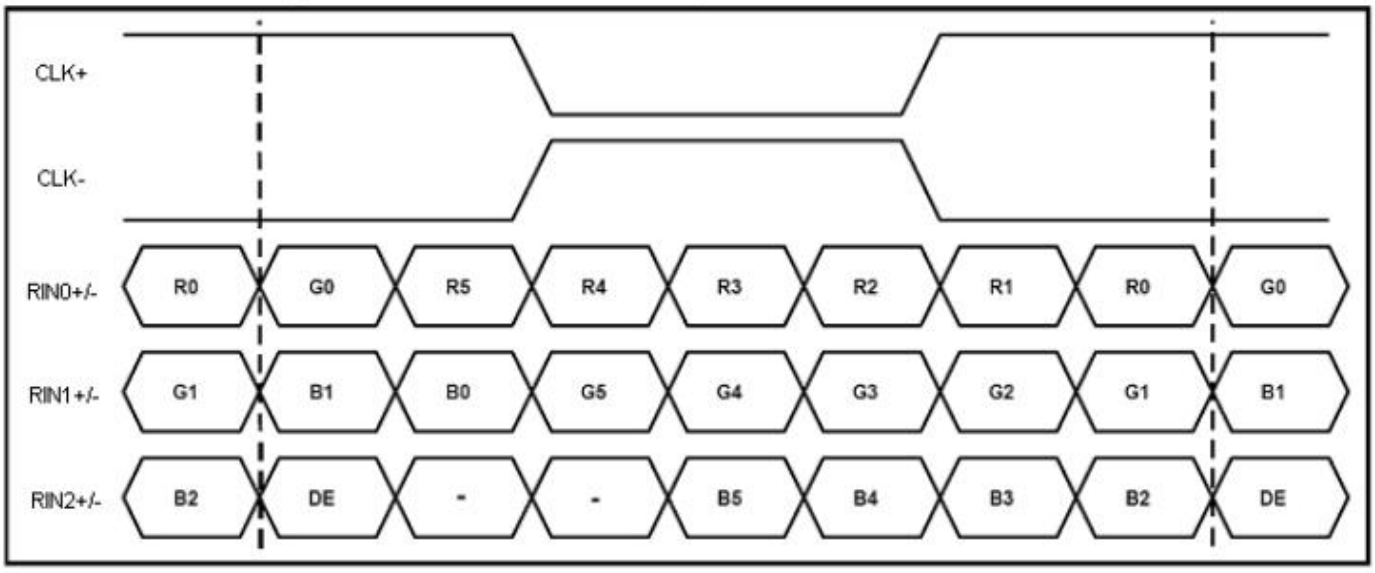


5.4.4 data timing

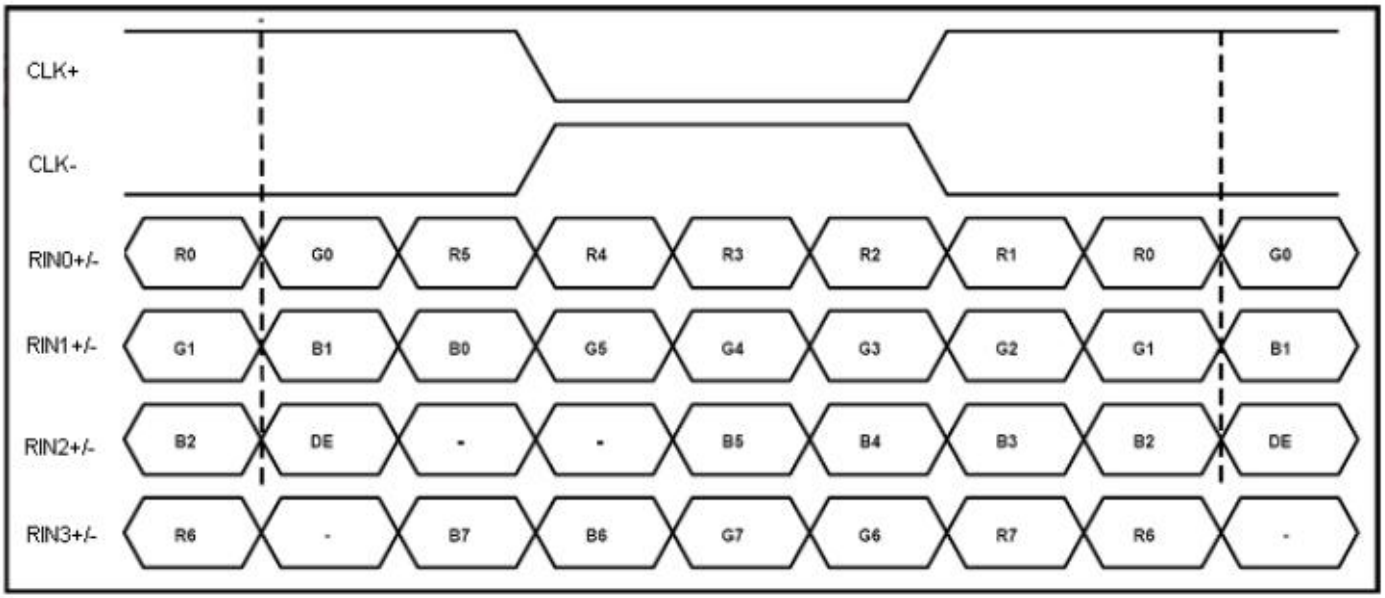
Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK frequency	fclk	52	65	71	MHz
Horizontal display area	thd		1024		DCLK
HSD period	th	1114	1344	1400	DCLK
HSD blanking	thb+thfp	90	320	376	DCLK
Vertical display area	tvd		768		T_H
VSD period	tv	778	806	845	T_H
VSD blanking	tvbp+tvfp	10	38	77	T_H

5.4.5 LVDS data input format

SEL6/8 = “High” for 6 bits LVDS Input



SEL6/8 = “Low” or “NC” for 8 bits LVDS Input



6 Optical Characteristics

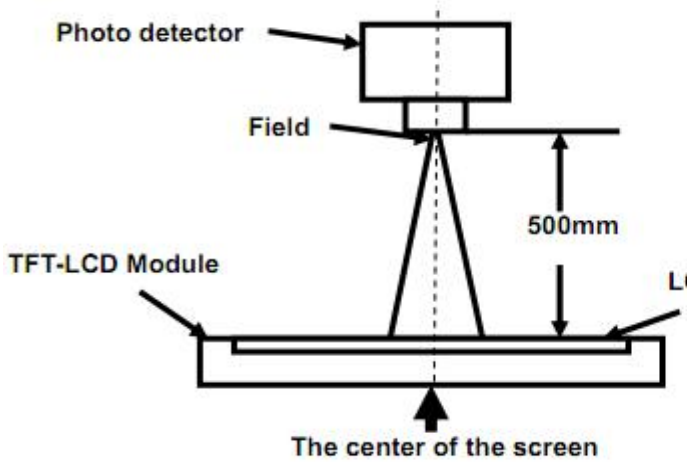
Items		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing angles	Horizontal	X+	Center CR≥10	80	-	-	Degree.	Note2
		X-		80	-	-		
	Vertical	Y+		80	-	-		
		Y-		80	-	-		
Contrast Ratio		CR	Θ =0	800	1000	-	-	Note1, Note3
Luminance		L		-	500	-	cd/m²	Note1 Note7
Luminance Uniformity		Y_U		70	75	-	%	Note1 Note6
Response Time		T_R+T_F	θx=0°, θY =0°	-	25	35	ms	Note1, Note4
Color Chromaticity	Red	Rx	θx=0°, θY =0° R=G=B=255 Gray scale	-	-	-	-	Note1, Note5
		Ry			-			
	Green	Gx			-			
		Gy			-			
	Blue	Bx			-			
		By			-			
	White	Wx			-			
		Wy			-			
Color Gamut		U		50	61.2	-	%	Note1, Note6
Center Transmittance		T%		5.16	5.64	-	%	Note1, Note6

Test Conditions:

1. IF= 30mA(one channel),the ambient temperature is 25°C.
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).

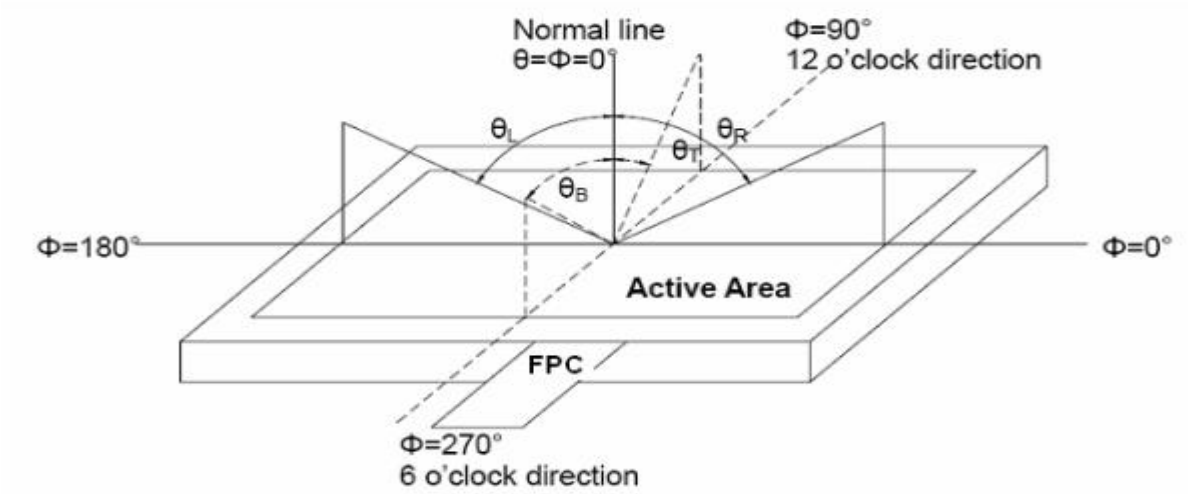


Fig. 1 Definition of viewing angle

Note 3: Definition of contrast ratio

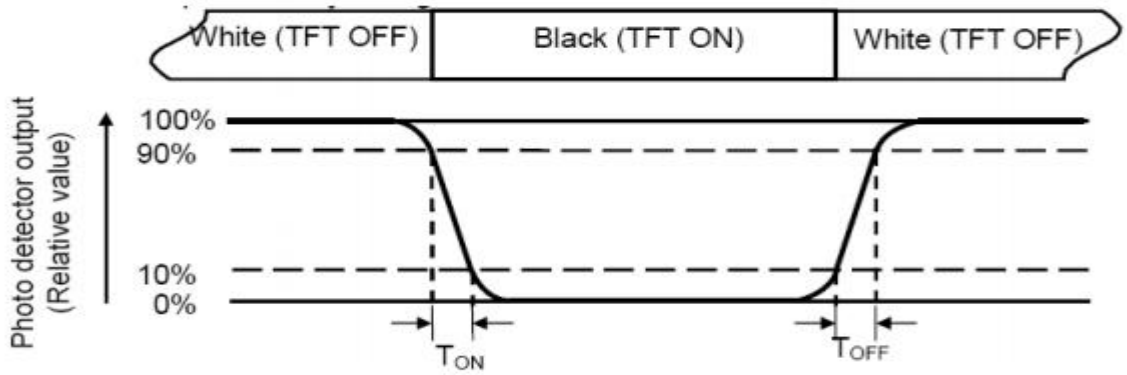
$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

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

“Black state”: The state is that the LCD should 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 X100%
L-------Active area length W----- Active area width

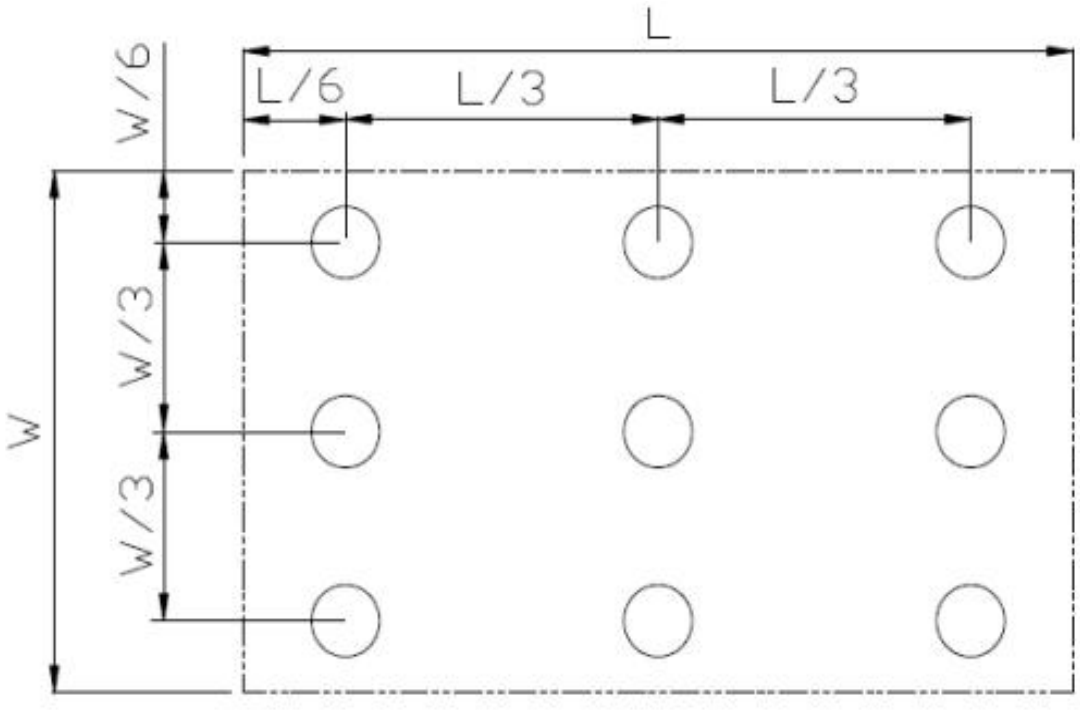


Fig. 2 Definition of uniformity
Lmax: The measured maximum luminance of all measurement position.
Lmin: The measured minimum luminance of all measurement position.

Note 7: Definition of Luminance :
Measure the luminance of white state at center point.

7 Environmental / Reliability Tests

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts= +70℃, 96hrs	IEC60068-2-1:2007 GB2423. 2-2008
2	Low Temperature Operation	Ta= -20℃, 96hrs	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Storage	Ta= +70℃,96hrs	IEC60068-2-1:2007 GB2423. 2-2008
4	Low Temperature Storage	Ta= -20℃, 96hrs	IEC60068-2-1:2007 GB2423.1-2008
5	High Temperature & Humidity Operation	Ta= +70℃, 90% RH max,96 hours	IIEC60068-2-78:2001 GB/T2423.3-2006
6	Thermal Shock (Non-operation)	-20℃ 30 min ~ +70℃ 30 min Change time: 5min, 20 Cycle	Start with cold temperature, end with high temperature IEC60068-2-14:1984, GB2423.22-2002
7	ESD	C=150pF, R=330 Ω, 5 points/panel , Air:±8KV, 5 times Contact: ±4KV, 5 times (Environment: 15℃ ~ 35℃, 30% ~ 60%, 86Kpa ~ 106Kpa)	IEC61000-4-2:2001 GB/T17626.2-2006
8	Vibration (Non-operation)	Frequency range: 10~55Hz, Stroke: 1.5mm , Sweep: 10Hz~55Hz~10Hz 2 hours for each direction of X .Y. Z. (6 hours for total)	IEC60068-2-6:1982 GB/T2423.10-1995
9	Mechanical Shock (Non-operation)	Half Sine Wave 60G ,6ms,±X,±Y,±Z 3times for each direction	IEC60068-2-27:1987 GB/T2423.5—1995
10	Package Drop Test	Height: 60 cm, 1 corner, 3 edges, 6 surfaces	IEC60068-2-32:1990 GB/T2423.8-1995

Notes:

1. The test result shall be evaluated after the sample has been left at room temperature and humidity for 2 hours without load. No condensation shall be accepted. The sample will not be accepted if appear these defects:

1).Air bubble in the LCD;
2).Seal leak
3).Non-display
4).missing segments
5).Glass crack
6).CR reduction >40%
7).IDD increase >100%
8).Brightness reduction >50%
9).Color coordinate tolerance >0.05

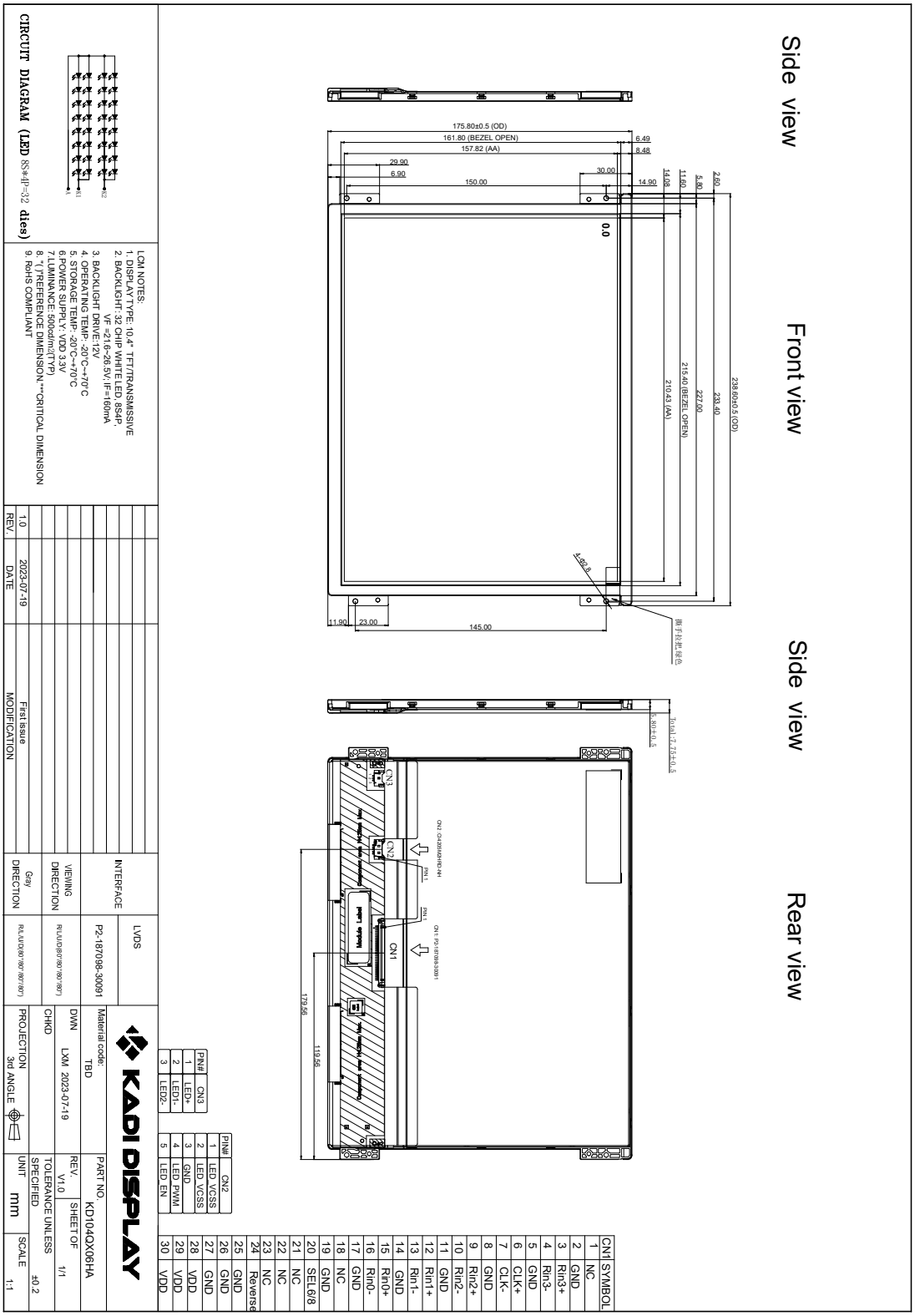
2.≤7.0 inch：The size of sample is 5pcs；
　＞7.0 inch：The size of sample is 2pcs；

3. One test sample must complete each test item;

4.In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judge as a good part.

5.In the test of High Temperature Operation and High Temperature & Humidity Operation ,the operation temperature is the surface temperature of module.

8 Mechanical Drawing



9 Packing

Packing Method

TBD

10 Precautions for Use of LCD modules

10.1 Handling Precautions

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

10.1.2. 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.

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

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

10.1.5. 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
- Ketene
- Aromatic solvents

10.1.6. Do not attempt to disassemble the LCD Module.

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

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

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

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

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

10.1.8.4. 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.

10.2 Storage Precautions

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

10.2.2.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 :

Temperature : 0℃ ~40℃ Relatively humidity: ≤80%

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

10.3 Transportation Precautions

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