MODEL NO. : TM062RDS01

ISSUED DATE: 2013-01-25

VERSION : Ver. 2.0

□Preliminary Specification
■Final Product Specification

Customer :_____

Approved by	Notes

SHANGHAI AVIC Confirmed :

Prepared by	Checked by	Approved by
Guangqing Zhou 2013/01/25	Jack Huang 2013/01/25	Hawkin He 2013/01/25

This technical specification is subjected to change without notice

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Record of Revision

Rev	Issued Date	Description	Editor
1.0	2012-07-26	Preliminary Specification Release	Guangqing Zhou
2.0	2013-01-25	Final Specification Release	Guangqing Zhou

1 General Specifications

Feature		Spec
Display Spec	Size	6.2 inch
	Resolution	800(RGB) * 480
	Interface	TTL 24 bits
	Color Depth	16.7M
	Technology Type	a-Si
	Pixel Pitch (mm)	0.1717*0.1610
	Pixel Configuration	RGB Vertical Stripe
	Display Mode	Normal White ,TN
	Surface Treatment(Up Polarizer)	Anti Glare
	Viewing Direction	12 o'clock
	Gray Scale Inversion Direction	6 o'clock
Mechanical Characteristics	LCM (W x H x D) (mm)	155.20*88.20*4.90
	Active Area(mm)	137.40*77.28
	With /Without TSP	Without TSP
	Weight (g)	118
	LED Numbers	24 LEDs

Note 1: Viewing direction for best image quality is different from TFT definition. There is a 180 degree shift.

Note 2: Requirements on Environmental Protection: RoHS

Note 3: LCM weight tolerance: +/- 5%

2 Input/Output Terminals

2.1 CN1 of FPC

No	Symbol	I/O	Description	Comment
1	AGND	P	Ground	
2	AVDD	P	Analog Power	
3	VCC	P	Digital Power Supply	
4	R0	I	Red Data(LSB)	When input 18 bits RGB data,R0 must be grounded
5	R1	I	Red Data	When input 18 bits RGB data,R1 must be grounded
6	R2	I	Red Data	
7	R3	I	Red Data	
8	R4	I	Red Data	
9	R5	I	Red Data	
10	R6	I	Red Data	
11	R7	I	Red Data	
12	G0	I	Green Data(LSB)	When input 18 bits RGB data,G0 must be grounded
13	G1	I	Green Data	When input 18 bits RGB data,G1 must be grounded
14	G2	I	Green Data	
15	G3	I	Green Data	
16	G4	I	Green Data	
17	G5	I	Green Data	
18	G6	I	Green Data	
19	G7	I	Green Data	
20	B0	I	Blue Data(LSB)	When input 18 bits RGB data,B0 must be grounded
21	B1	I	Blue Data	When input 18 bits RGB data,B1 must be grounded
22	B2	I	Blue Data	
23	B3	I	Blue Data	
24	B4	I	Blue Data	
25	B5	I	Blue Data	
26	B6	I	Blue Data	
27	B7	I	Blue Data	
28	DCLK	I	Dot Clock Input	Data shall be latched at the falling edge of DCLK
29	DE	I	Data Enable Signal	
30	HSD	I	Horizontal Sync Input, Negative Polarity	
31	VSD	I	Vertical Sync Input, Negative Polarity	
32	MODE	I	DE/SYNC Mode Select. Normally pull high	H: DE mode(Default), L: SYNC mode
33	RSTB	I	Global Reset Pin	
34	STBYB	I	Standby Mode Select;H:normal operation, L:standby mode	
35	SHLR	I	Source Right or Left Sequence Control	
36	VCC	P	Digital Power	

37	UPDN	I	Gate Up or Down Scan Control	
38	GND	P	Ground	
39	AGND	P	Ground	
40	AVDD	P	Analog Power	
41	VCOM	I	Common Voltage Input	
42	DITHB	I	Dithering Setting. H:6bit Resolution,L:8bit Resolution	DITHB=1,disable internal dithering function; DITHB=0, enable internal dithering function;
43	NC	N	No Connection	
44	NC	N	No Connection	
45	V10	I	Gamma Voltage 10	
46	V9	I	Gamma Voltage 9	
47	V8	I	Gamma Voltage 8	
48	V7	I	Gamma Voltage 7	
49	V6	I	Gamma Voltage 6	
50	V5	I	Gamma Voltage 5	
51	V4	I	Gamma Voltage 4	
52	V3	I	Gamma Voltage 3	
53	V2	I	Gamma Voltage 3	
54	V1	I	Gamma Voltage 1	
55	NC	N	No Connection	
56	VGH	P	Positive Power for TFT	
57	VCC	P	Digital Power	
58	VGL	P	Negative Power for TFT	
59	GND	P	Ground	
60	NC	N	No Connection	

I/O definition：I --- Input ; O --- Output ; P --- Power ; N --- No Connection ;

3 Absolute Maximum Ratings

(AGND= GND=0V, Ta = 25℃)

Item	Symbol	MIN	MAX	Unit	Remark
Power Supply Voltage 1	VCC	-0.50	5.00	V	Base on IC Spec
Power Supply Voltage 2	AVDD	-0.50	15.00	V	Base on IC Spec
Power Supply Voltage 3	VGH	-0.30	42.00	V	Base on IC Spec
Power Supply Voltage 4	VGL	VGH-42.00	0.30	V	Base on IC Spec
Back Light Forward Current	I_{LED}	-	25	mA	For each LED
Operating Temperature	T_{OPR}	-20	70	℃	Base on RA
Storage Temperature	T_{STG}	-30	80	℃	Base on RA

Table 3.1 absolute maximum rating

4 Electrical Characteristics

4.1 Recommended Operating Condition

(GND=AGND= 0V, TA= 25°C)

Item		Symbol	MIN	TYP	MAX	Unit	Remark
Logic Supply Voltage 1		VCC	2.8	3.3	3.6	V	--
Logic Supply Voltage 2		AVDD	10.3	10.5	10.8	V	--
Logic Supply Voltage 3		VGH	19.7	20	20.3	V	--
Logic Supply Voltage 4		VGL	-7.3	-7.0	-6.7	V	--
Logic Supply Voltage 6		VCOM	3.9	4.0	4.1	V	--
Input Signal Voltage	Low Level	VIL	0	-	0.3*VCC	V	--
	High Level	VIH	0.7*VCC	-	VCC	V	
Output Signal Voltage	Low Level	V_{OL}	-	-	GND+0.4	V	--
	High Level	V_{OH}	VCC-0.4	-	-	V	
Power Consumption		Black Mode (60Hz)	-	355	-	mW	--
		Back Light		1536	1920	mW	--

Table 4.1 LCD Module Electrical Characteristics(TTL Mode)

4.2 Backlight Unit

Ta=25℃

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	IF	--	160	200	mA	24 LEDs (3 LED Serial, 8 LED Parallel)
Forward Voltage	VF	--	9.6	--	V	
Backlight Power Consumption	WBL	--	1.536	1.920	W	

Table 4.2 Backlight Unit Electrical Characteristics

Note1: The LED driving condition is defined for each LED module (3 LED Serial, 8 LED Parallel) .For each LED : IF (1/8)=20mA, VF (1/3)=3.2V.

Note 2 : Under LCM operating, the stable forward current should be inputted. And forward voltage is for reference only.

Note3: The minimum life of LED is 10,000 hours, which is defined that the brightness becomes 50% of the original value under standard condition.

Note 4 : The LED driving condition is defined for each LED module

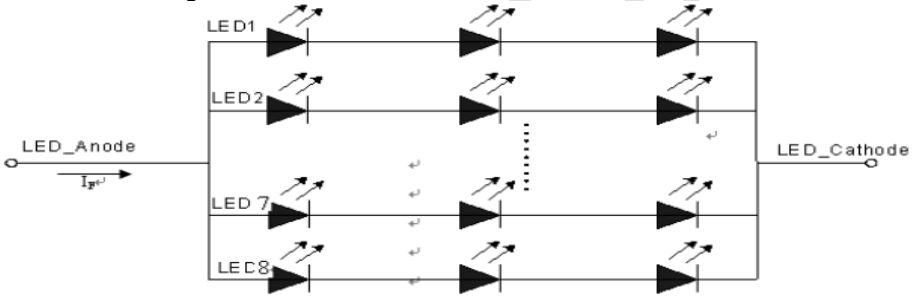
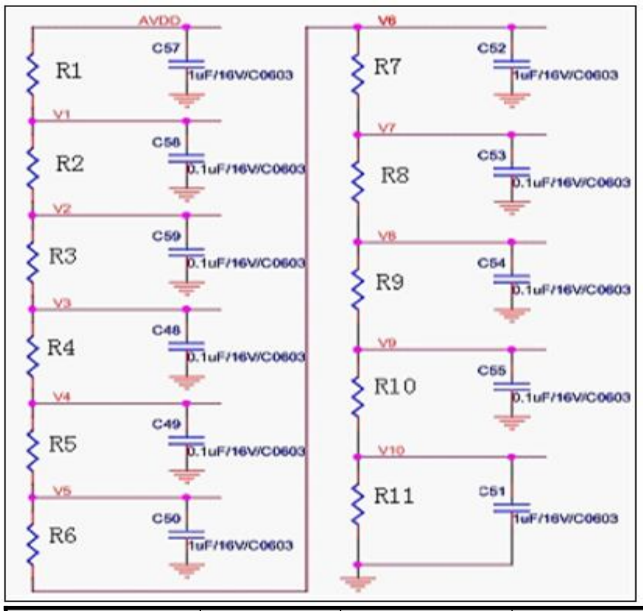


Figure 4.1 LED driver circuit

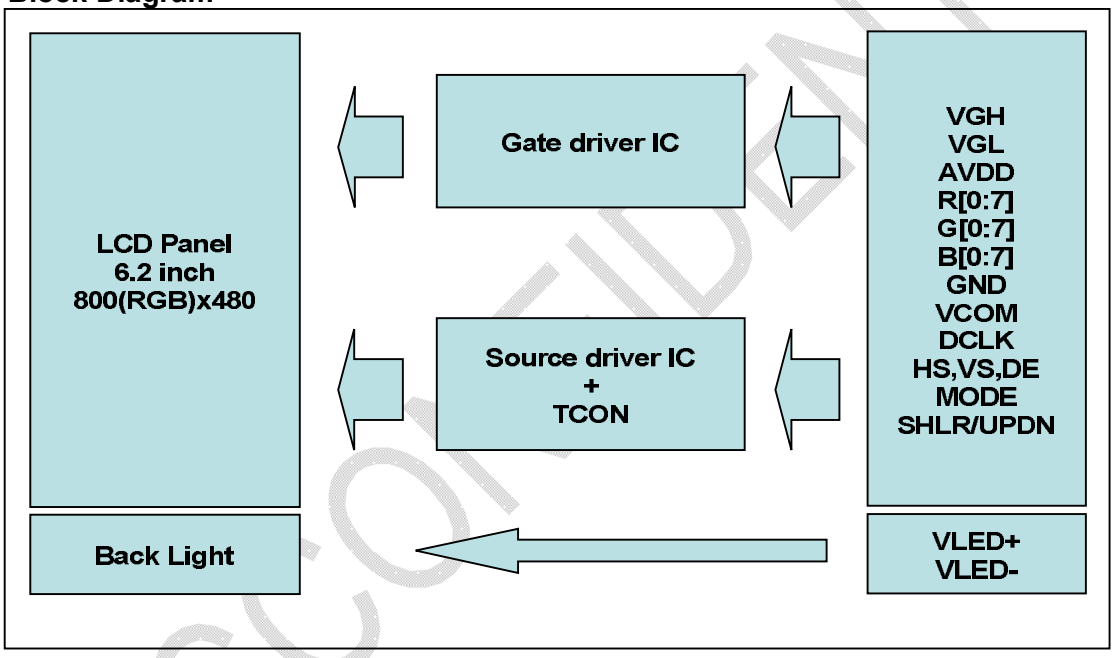
4.3 Gamma Correction Reference Voltage Setting



Symbol	Unit	Resistance
R1	Ω	124
R2	Ω	732
R3	Ω	232
R4	Ω	154
R5	Ω	698
R6	Ω	39
R7	Ω	698
R8	Ω	154
R9	Ω	232
R10	Ω	732
R11	Ω	110

Parameter	Symbol	MIN	TYP	MAX	Unit	Remark
Gamma correction reference voltage V1~V14	V1	-	10.04	-	V	
	V2	-	8.09	-	V	
	V3	-	7.48	-	V	
	V4	-	7.07	-	V	
	V5	-	5.22	-	V	
	V6	-	5.11	-	V	
	V7	-	3.26	-	V	
	V8	-	2.85	-	V	
	V9	-	2.24	-	V	
	V10	-	0.29	-	V	

4.4 Block Diagram



5 Timing Chart

5.1 Input Clock And Data Timing(800*480)

Parameter	Symbol	Min	Typ	Max	Unit
DCLK Frequency	fclk	-	30	50	MHz
One Horizontal Line	th	889	928	1143	DCLK
Horizontal Display Area	thd		800		DCLK
HS Pulse width	thpw	1	48	255	DCLK
HS Back Porch	thb		88		DCLK
HS Front Porch	thfp	1	40	255	DCLK
DE Mode Blanking	th-thd	85	128	512	DCLK
VS Period time	tv	513	525	767	Th
Vertical Display Area	tvd		480		Th
VS Pulse Width	tvpw	3	3	255	Th
VS Back Porch	tvb		32		Th
VS Front Porch	tvfp	1	13	255	Th
DE Mode Blanking	Tv-tvd	4	45	255	Th

Table 5.1 Input Timing (DCLK, HSD, VSD, DE)

5.2 Timing Waveform Table (Parallel 24-bit RGB mode)

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
CLKIN Frequency	Fclk	-	40	50	MHz	VDD=3.0V~3.6V
CLKIN Cycle Time	Tclk	20	25	-	ns	-
CLKIN Pulse Duty	Tcwh	40	50	60	%	Tclk
Time from HSD to Source Output	Thso		64		CLKN	-
Time from HSD to LD	Thld		64		CLKN	-
Time from HSD to STV	Thstv		2		CLKN	-
Time from HSD to CKV	Thckv		20		CLKN	-
Time from HSD to OEV	Thoev		4		CLKN	-
LD Pulse Width	Twld		10		CLKN	-
CKV Pulse Width	Twckv		66		CLKN	-
OEV Pulse Width	Twoev		74		CLKN	-

Table 5.2 Parallel 24-bit RGB mode

5.3 Timing Diagram

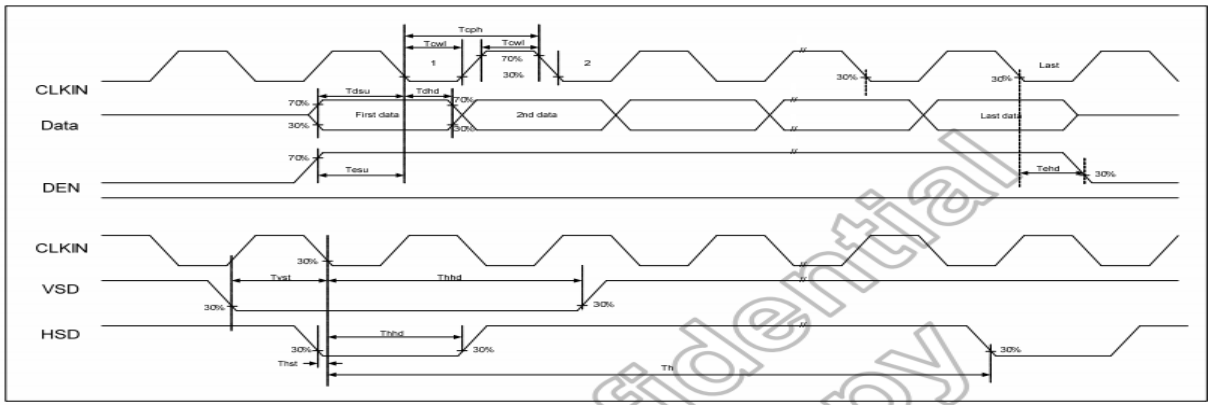


Figure 5.1 TTL Input Clock and Data timing Diagram

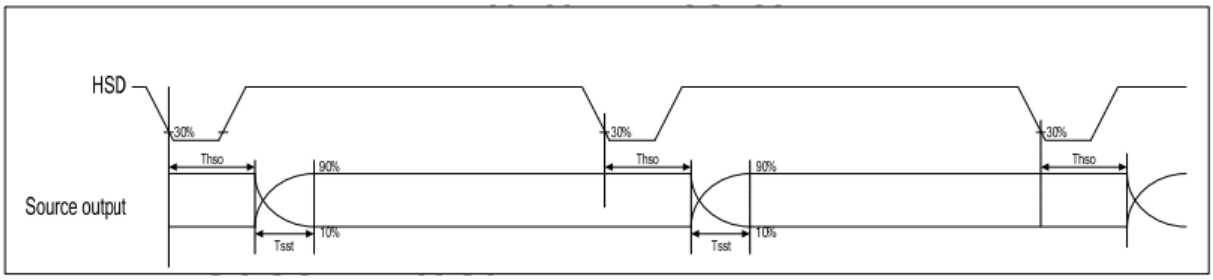


Figure 5.2 Source Output Timing Diagra

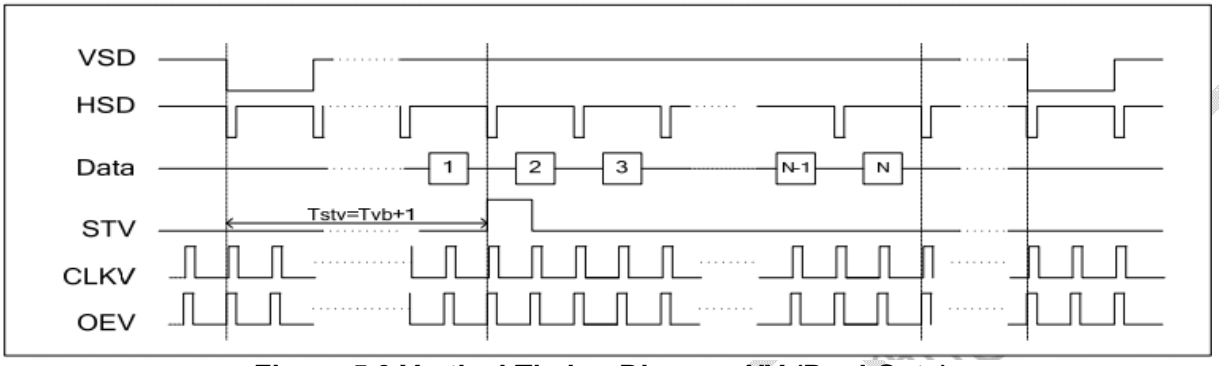


Figure 5.3 Vertical Timing Diagram HV (Dual Gate)

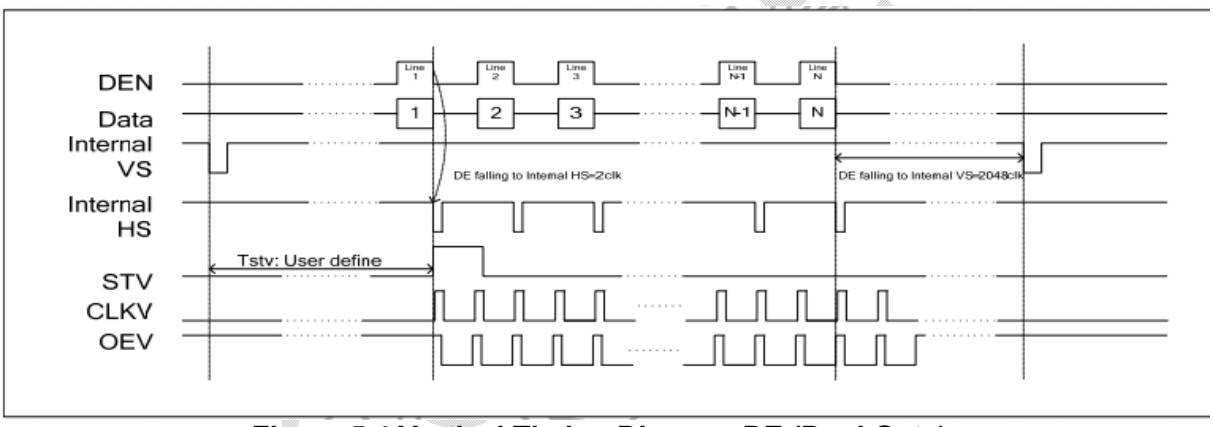


Figure 5.4 Vertical Timing Diagram DE (Dual Gate)

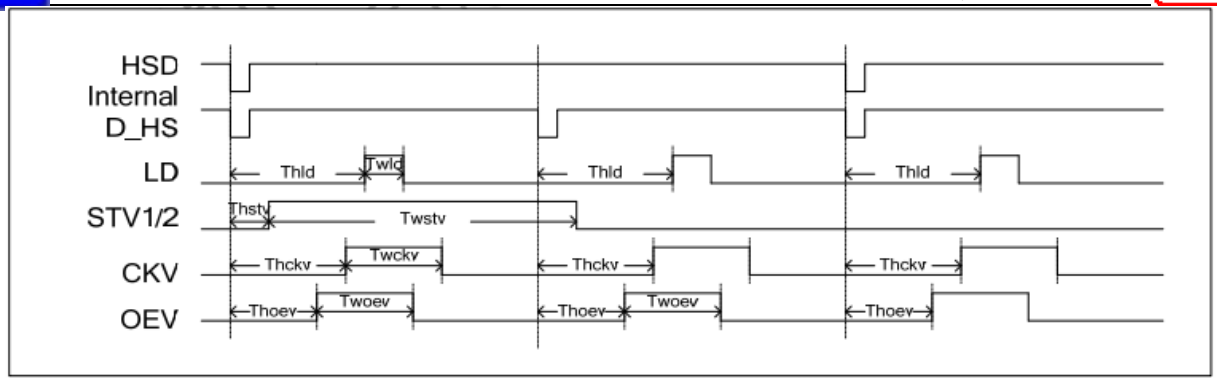


Figure 5.5 Gate Output Timing Diagram (Dual Gate)

5.4 Power On/Off Sequence

To prevent the device damage from latch up, the power on/off sequence shown below must be followed.

Source IC:

Power ON : VDD, VSS --> VDDA, VSSA --> V1 to V14

Power OFF: V1 to V14 --> VDDA, VSSA --> VDD, VSS

Gate IC:

Power ON : VDD→VEE→VGH

Power OFF: VGH→VEE→VDD

Note :VDDA = AVDD; VDD = VCC; VSS = GND; VSSA = GND; VEE = VGL ;

5.5 Power On/Off Control

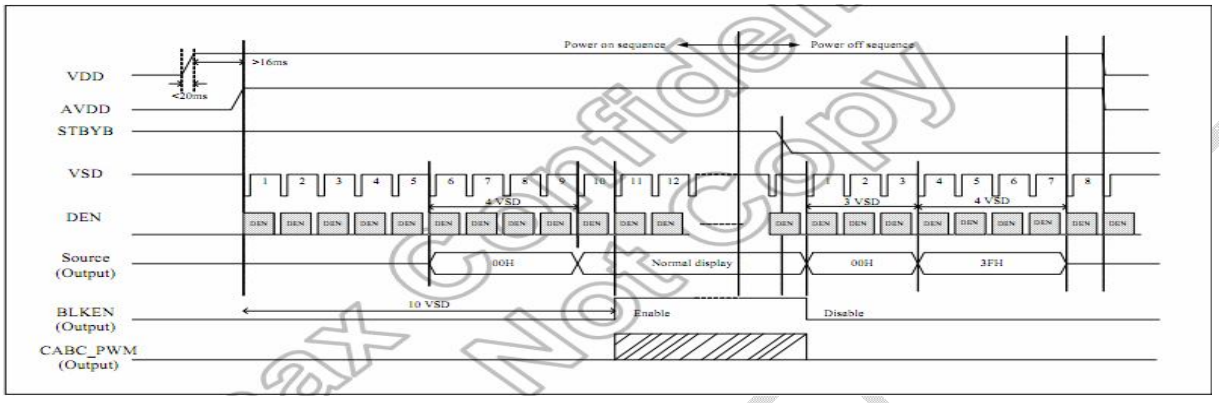


Figure 5.6 Source Power On/Off Timing Sequence

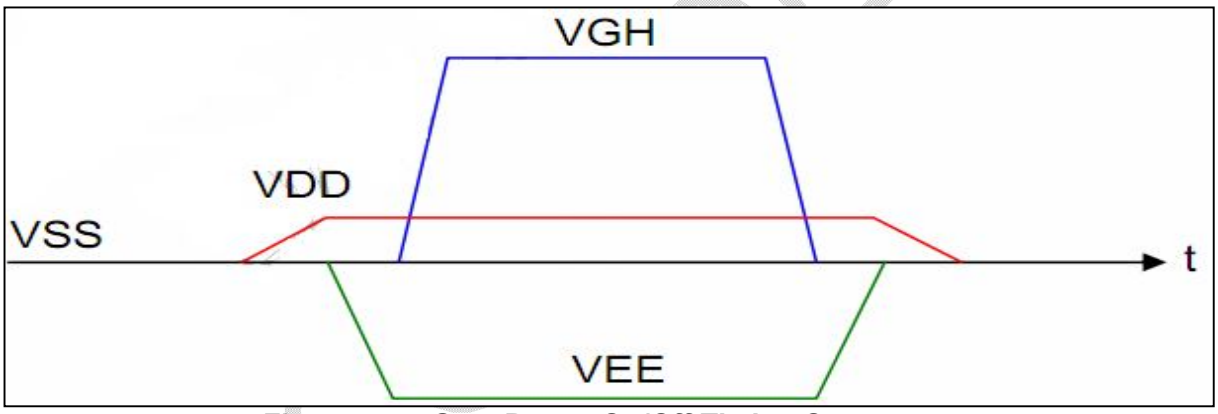


Figure 5.7 Gate Power On/Off Timing Sequence

5.6 Enter And Exit Standby Mode Sequence

HX8264-D has a power on/off sequence control function. In order to prevent IC from power on reset fail, the rising time (TPOR) of the digital power supply VDD should be maintained within the given specifications. lease refer to “AC Characteristics” for more detail on timing.

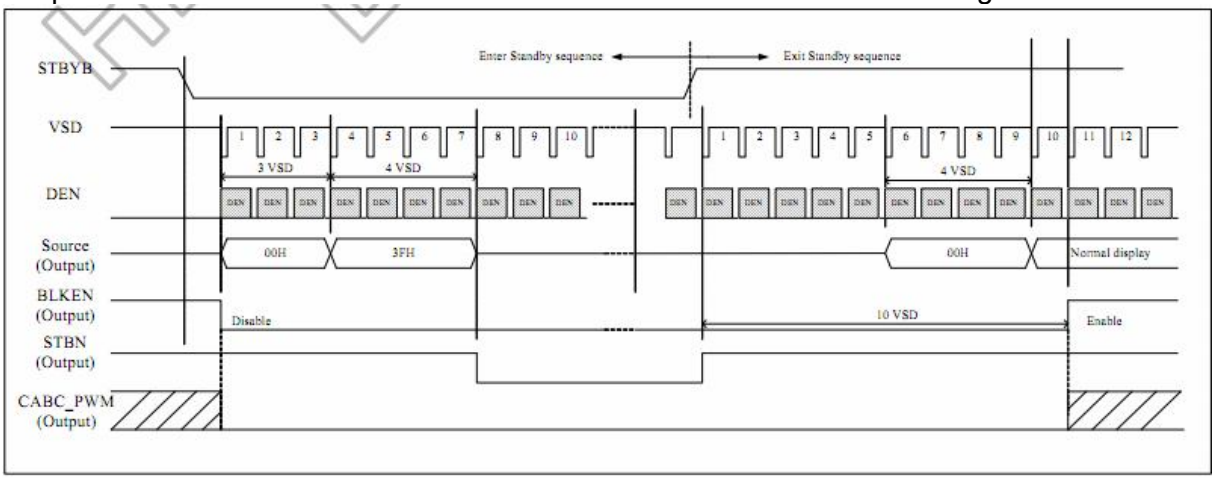


Figure 5.8 Enter And Exit Standby Mode Sequence

6 Optical Characteristics

Ta=25℃

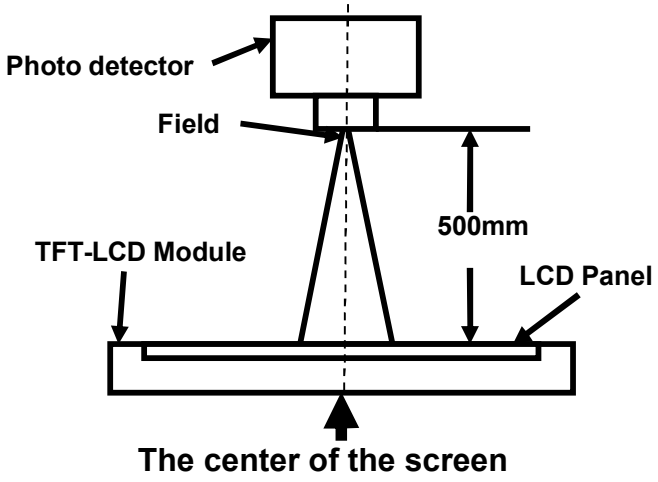
Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	50	60	-	Degree	Note 2
		θB		60	70	-		
		θL		65	75	-		
		θR		65	75	-		
Contrast Ratio		CR	θ=0°	400	500	-	--	Note1 Note3
Response Time		T_{ON}	25℃	-	20	30	ms	Note1 Note4
		T_{OFF}						
Chromaticity	White	x	Backlight is on	0.256	0.306	0.356	--	Note1 Note5
		y		0.273	0.323	0.373		
	Red	x		0.551	0.601	0.651		
		y		0.316	0.366	0.416		
	Green	x		0.272	0.322	0.372		
		y		0.505	0.555	0.605		
	Blue	x		0.102	0.152	0.202		
		y		0.053	0.103	0.153		
Uniformity		U	--	75	80	--	%	Note1 Note6
NTSC		--	--	45	50	-	%	Note 5
Luminance		L	--	320	400	-	cd/m^2	Note1 Note7

Test Conditions:

1. I_F= 120 mA, V_F=19.2 V and the ambient temperature is 25℃.
2. The test systems refer to Note 1 and Note 2.

Note 1: Definition of optical measurement system.

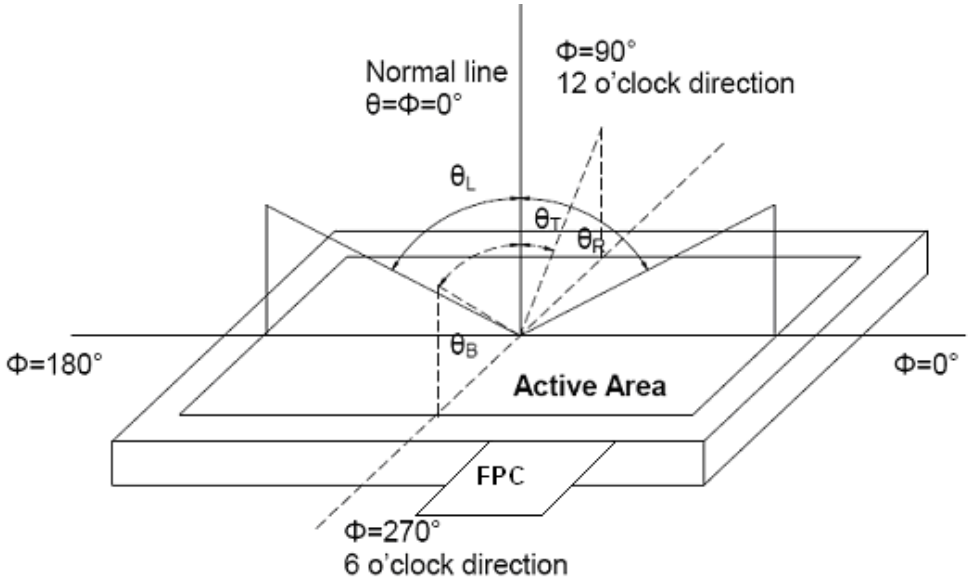
The optical characteristics should be measured in dark room. After 5 Minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



Item	Photo detector	Field
Contrast Ratio	BM-5A	1°
Luminance		
Lum Uniformity		
Chromaticity	SR-3A	
Response Time	TRD100	-

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)。



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 drive by Vwhite.

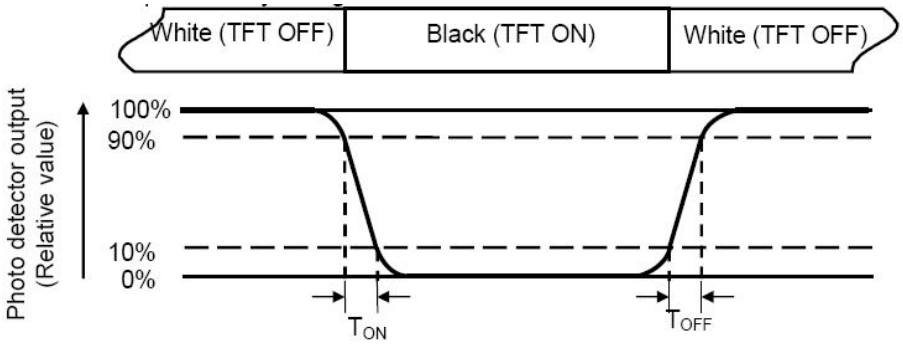
"Black state": The state is that the LCD should drive by Vblack.

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 (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 5: Definition of color chromaticity (CIE1931)

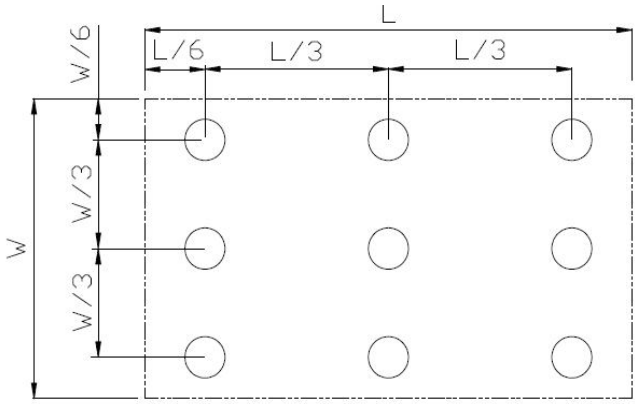
Color coordinates measured at center point of LCD.

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



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

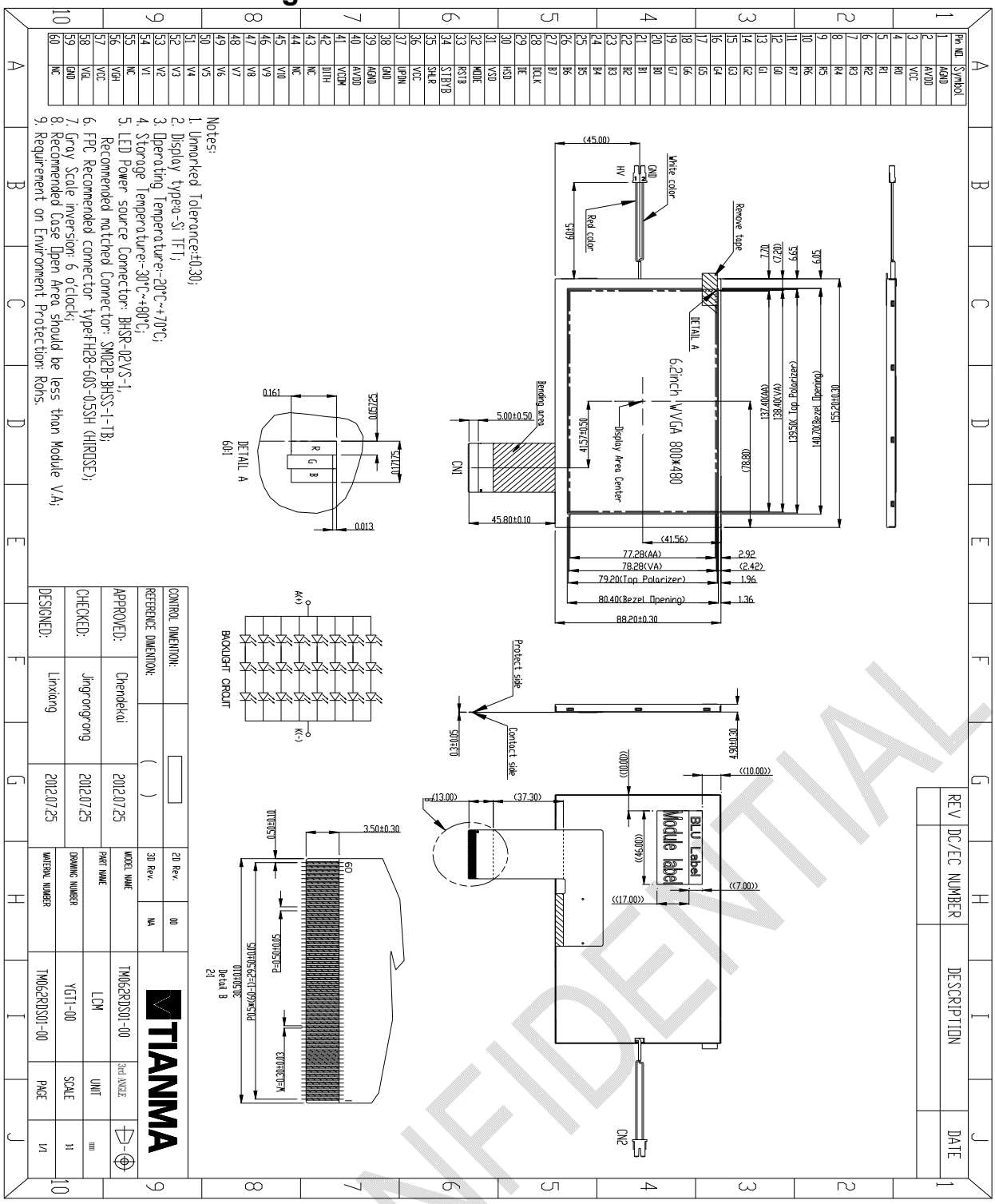
No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts = +70℃, 240 hours	IEC60068-2-1 GB2423.2
2	Low Temperature Operation	Ta = -20℃, 240 hours	IEC60068-2-1 GB2423.1
3	High Temperature Storage	Ta = +80℃, 240 hours	IEC60068-2-1 GB2423.2
4	Low Temperature Storage	Ta = -30℃, 240 hours	IEC60068-2-1 GB2423.1
5	Storage at High Temperature and Humidity	Ta = +60℃, 90% RH max,240hours	IEC60068-2-78 GB/T2423.3
6	Thermal Shock (non-operation)	-30℃ 30 min~+80℃ 30 min, Change time:5min, 20 Cycle	Start with cold temperature,End with high temperature, IEC60068-2-14,GB2423.22
7	ESD	C=150pF,R=330Ω,5point/panel Air:±8Kv,5times; Contact:±4Kv,5times (Environment:15℃~35℃, 30%~60%.86Kpa~106Kpa)	IEC61000-4-2 GB/T17626.2
8	Package Vibration Test	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 GB/T2423.10
9	Mechanical Shock (Non Op)	Half Sine Wave 60G 6ms, ±X,±Y,±Z 3times for each direction	IEC60068-2-27 GB/T2423.5
10	Package Drop Test	Height:60cm, 1corner,3edges,6surfaces	IEC60068-2-32 GB/T2423.8

Note1: Ts is the temperature of panel's surface.

Note2: Ta is the ambient temperature of samples.

Note3: In the standard condition,there is not display function NG issue occurred.All the cosmetic specification is judged before the reliability stress.

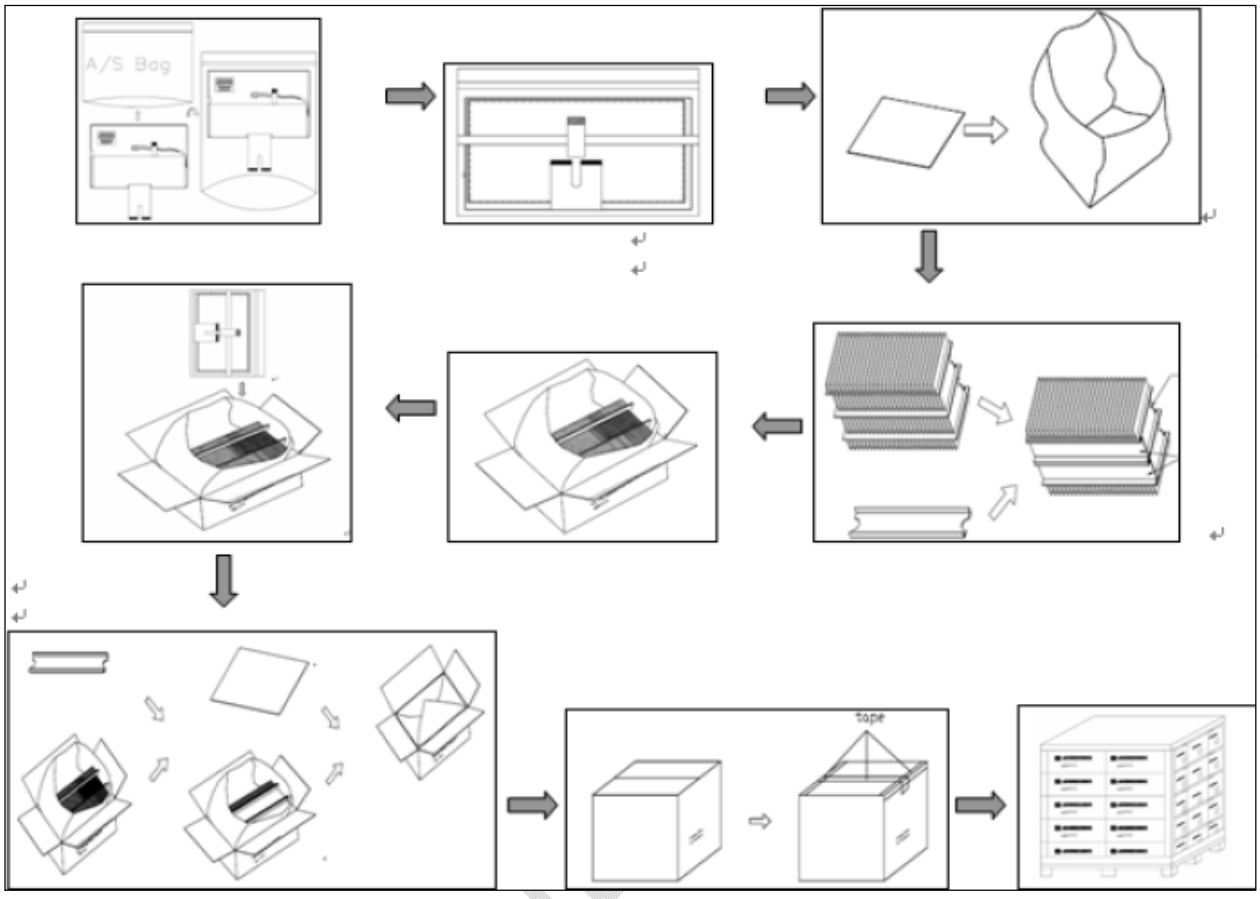
8 Mechanical Drawing



9 Packing drawing

9.1 Packaging Material

No	Item	Model (Material)	Dimensions (mm)	Unit Weight(Kg)	Quantity	Remark
1	LCM module	TM062RDS01-00	155.2X88.2X4.9	0.118	136	
2	Partition_1	Corrugated paper	513X413X95	0.876	2	
3	Anti-static Bag	PE	173X150X0.05	0.001	136	
4	Dust-Proof Bag	PE	700X530	0.06	1	
5	Partition_2	Corrugated Paper	513X413	0.142	8	
6	Carton	Corrugated paper	530X430X274	1.09	1	
7	Total weight	20.22±5%				



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
- Ketone
- 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

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